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THE PELAGIC COPEPODS OF THE IZU REGION, MIDDLE JAPAN SYSTEMATIC ACCOUNT XI

FAMILY AUGAPTILIDAE

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With 28 Text-figures

Family AUGAPTILIDAE

Genus *Haloptilus* (GIESBRECHT).

A. SCOTT recorded the occurrence of 4 species from the Malay Archipelago, namely, *Haloptilus longicornis* (CLAUS), *H. ornatus* (GIESBRECHT), *H. plumulosus* (GIESBRECHT) and *H. spiniceps* (GIESBRECHT). SEWELL (1932, 1947) recorded the occurrence of *H. chierchiae* (GIESBRECHT) and *H. ornatus* from the Indian seas, and the following species from the Arabian Sea: *H. acutifrons* GIESBRECHT, *H. chierchiae*, *H. mucronatus*, (CLAUS), *H. ornatus*, *H. oxycephalus* (GIESBRECHT) and *H. validus* SARS. MORI (1937) recorded the occurrence of *H. longicornis*, *H. ornatus*, *H. spiniceps*, *H. mucronatus*, *H. acutifrons* and *H. oxycephalus*. From the far-eastern and polar seas of the USSR BRODSKY recorded *H. longicornis*, *H. longicirrus* BRODSKY, *H. acutifrons*, *H. pseudoxycephalus* BRODSKY. I have recorded 7 species from the Izu region, they are: *H. longicornis*, *H. acutifrons*, *H. oxycephalus*, *H. spiniceps*, *H. ornatus*, *H. setuliger* and *H. longiceps*. Among these the last 2 species appear to be undescribed.

Haloptilus longicornis (CLAUS).

(Fig. 192, a-g)

Hemicalanus longicornis, GIESBRECHT, 1892, p. 384, t. 1, fig. 4; t. 2, fig. 13; t. 27, figs. 3, 8-10, 29; *Haloptilus longicornis*, SARS, 1903, p. 121, pls. lxxxii, lxxxiii; A. SCOTT, 1909, p. 140; FARRAN, 1929, p. 269; 1936, p. 113; MORI, 1937, p. 75, pl. 38, figs. 5-14; BRODSKY, 1950, p. 362, text-fig. 253; WILSON, 1950, p. 236.

Female. Length, 2.14-2.25 mm. The frontal margin of the head has a median papilla. The abdomen is contained about 6 times in the length of the cephalo-

thorax. The 1st antenna very long, about 2 times as long as the combined lengths of the cephalothorax and abdomen. The mouth parts and swimming legs as described and figured by GIESBRECHT.

Male. Length, 1.16 mm. The abdomen 5-jointed; the segments and furca are in the proportional lengths as $24 : 17 : 14 : 10 : 14 : 21 = 100$. The furcal rami 1.2 times as long as wide. In the 5th pair of legs the 2nd basal segment of the left leg is furnished with several streaks on the surface of the segment near the inner margin.

Occurrence. The species is frequent in the adjacent waters of Japan. The

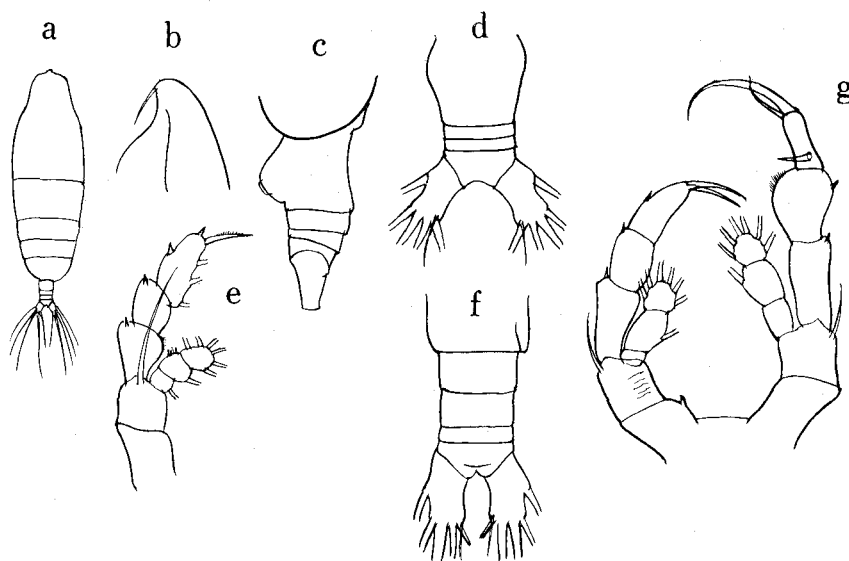


Fig. 192. *Haloptilus longicornis* (CLAUS).

Female: a, dorsal aspect; b, head, lateral aspect; c, abdomen, lateral aspect; d, abdomen, dorsal aspect; e, 5th leg. Male: f, abdomen, dorsal aspect; g, 5th pair of leg.

species has been collected both from the surface and deep waters in the Izu region.

Distribution. The species has a wide distribution in the great oceans, and also from the Mediterranean Sea, Arabian Sea and far-eastern seas of the USSR.

Haloptilus setuliger sp. nov.

(Fig. 193, a-h)

Female. Length, 3.27 mm: cephalothorax, 2.70 mm; abdomen, 0.57 mm. General appearance as in *H. longicornis* (CLAUS). The cephalic segment longer

than the thoracic segments taken together. The frontal margin of the head more produced and is furnished with a prominent papilla. The rostral filaments very slender.

The abdominal segments and furca are in the proportional lengths as $38:9:6:22:25=100$. The genital segment about as long as wide. The furcal rami 1.6 times as long as wide; the appendicular seta feeble.

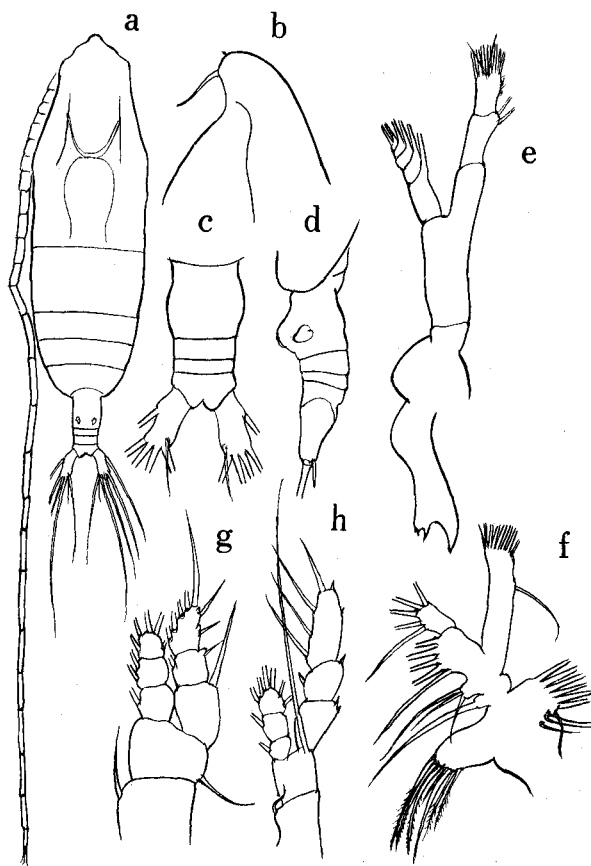


Fig. 193. *Haloptilus setuliger* sp. nov.

Female: a, dorsal aspect; b, head, lateral aspect; c, abdomen, dorsal aspect; d, last thoracic segment and abdomen, lateral aspect; e, mandible; f, 1st maxilla; g, 1st leg; h, 5th leg.

The 1st antenna exceeds the end of the furca by distal 10 segments; the joints are in the following proportional lengths:

Segments.	1	2	3	4	5	6	7	8	9	10	11	12	13	14
	36	12	15	18	21	21	21	24	27	27	30	33	45	52

15 16 17 18 19 20 21 22 23 24 25
61 67 85 58 64 58 52 55 52 36 30 = 1000

the segment 17 is the longest but much shorter than one and a half the length of the segment 19; in *H. longicornis* the segment 17 is equal to one and a half the length of the segment 19. The 2nd antenna has a slender endopod, about 2.7 times as long as the exopod; the 1st segment of the endopod 9 times as long as wide. The mandible has the exopod about as long as the endopod. The 1st maxilla as that of *H. longicornis* but the 2nd basal has 5 setae; in *H. longicornis* it is 4; the exopod has 9 setae, of which the middle 4 are long, the endopod has 5 setae. The 2nd maxilla and maxilliped as those of *H. longicornis*.

The 1st leg has 3-jointed exopod and endopod; the outer edge spine on the 1st segment of the exopod long, reaching the distal end of the 3rd segment of the exopod. The 2nd to 4th legs have no interesting features.

The 5th pair of legs small; the 2nd segment of the exopod has a small and curved marginal spine; the 1st basal segment has a small inner marginal seta; the seta on the 2nd basal segment is very long, exceeds much beyond the distal end of the terminal spine of the exopod.

Remarks. The specimen resembles well *H. longicornis* in general appearance but is easily distinguished from the latter in its large size, the shape of the genital segment, the structure of the 1st maxilla and by the small inner marginal seta on the 2nd segment of the 5th pair of legs. The species is also closely allied to *H. longicirrus* BRODSKY, but differs from it in the structure of the 5th pair of legs of the female; *H. longicirrus* has no inner edge spine on the 2nd segment of the exopod, and is devoid of the inner marginal seta on the 2nd basal segment.

Occurrence. 4 females from Sagami Bay from depths 1000–0 m.

Distribution. The Pacific coast of Middle Japan.

Haloptilus acutifrons (GIESBRECHT).

Hemicalanus acutifrons, GIESBRECHT, 1892, p. 384, t. 3, fig. 11; t. 27, fig. 12; t. 42, figs. 12, 20;
Haloptilus acutifrons, SARS, 1925, p. 250, pl. lxxiv, figs. 1–11; FARRAN, 1929, p. 267;
JESPERSEN, 1934, p. 110; FARRAN, 1936, p. 113; MORI, 1937, p. 77, pl. 39, figs. 1–4;
SEWELL, 1947, p. 190; BRODSKY, 1950, p. 364; VERVOORT, 1957, p. 135.

Female. Length, 2.99 mm. The frontal margin of the head produced into a long spine. The 1st antenna exceeds the end of the body by last 6 segments.

Occurrence. The species is rare in the Izu region. The species has been recorded from the surface layer.

Distribution. The species has been recorded from the North Atlantic, Arctic, Mediterranean and the Arabian Sea. In Japan recorded from warm currents.

Haloptilus oxycephalus (GIESBRECHT).

Hemicalanus oxycephalus, GIESBRECHT, 1892, p. 384, t. 42, figs. 7, 16; *Haloptilus oxycephalus* SARS, 1925, p. 252, pl. lxxiv, figs. 12-16; FARRAN, 1929, p. 268; MORI, 1937, p. 77, pl. 40, figs. 1-2; SEWELL, 1947, p. 194; VERVOORT, 1957, p. 136; WILSON, 1950, p. 237.

Female. Length, 3.56 mm. cephalothorax, 3.06 mm; abdomen, 0.50 mm. The cephalic segment produced anteriorly into a long spine which distinguishes the species from other members of the genus.

Occurrence. The species appears to be rare in Japanese waters. Only a single female was taken from Suruga Bay, July, 1937 from depths 1000-0 m.

Distribution. The species has been recorded from the Indian Ocean, the Mediterranean Sea and from the Arabian Sea. In Japan it has been recorded from warm waters.

Haloptilus spiniceps (GIESBRECHT).

Hemicalanus spiniceps, GIESBRECHT, 1892, p. 384, t. 27, figs. 6, 40; t. 42, figs. 38, 8, 10, 11; *Haloptilus spiniceps*, A. SCOTT, 1909, p. 141; SARS, 1925, p. 249; FARRAN, 1929, p. 268; 1936, p. 112; MORI, 1937, p. 76, pl. 39, figs. 9-14; WILSON, 1950, p. 237.

Immature female. Length, 2.29 mm. The head is produced into a spine slightly curved downwards. The 1st antenna exceeds the end of the furca by terminal 3 segments. The 1st maxilla has 2 setae on the endopod. The 5th pair of legs undeveloped, with 2-jointed exopod and endopod.

Occurrence. The species is rare in Japanese waters. One immature female was taken from Sagami from depths 1000-0 m in 1937.

Distribution. The species has been recorded from the Pacific and Indian Oceans, also from the Mediterranean Sea. In Japan it has been recorded from warm currents.

Haloptilus ornatus (GIESBRECHT).

Hemicalanus ornatus, GIESBRECHT, 1892, p. 384, t. 27, figs. 1, 6, 7, 21, 38; t. 42, figs. 1, 9, 19; A. SCOTT, 1909, p. 141 *Haloptilus ornatus*, SARS, 1925, p. 1247, pl. lxxiii, figs. 1-5; SEWELL, 1932, p. 328; MORI, 1937, p. 75, pl. 39, figs. 58; SEWELL, 1947, p. 194; WILSON, 1950, p. 236.

Female. Length, 4.54 mm. The frontal margin of the head produced but not pointed. The abdomen is contained 7.4 times in the length of the cephalothorax. The 1st antenna exceeds the end of the furca by terminal 4 or 5 segments.

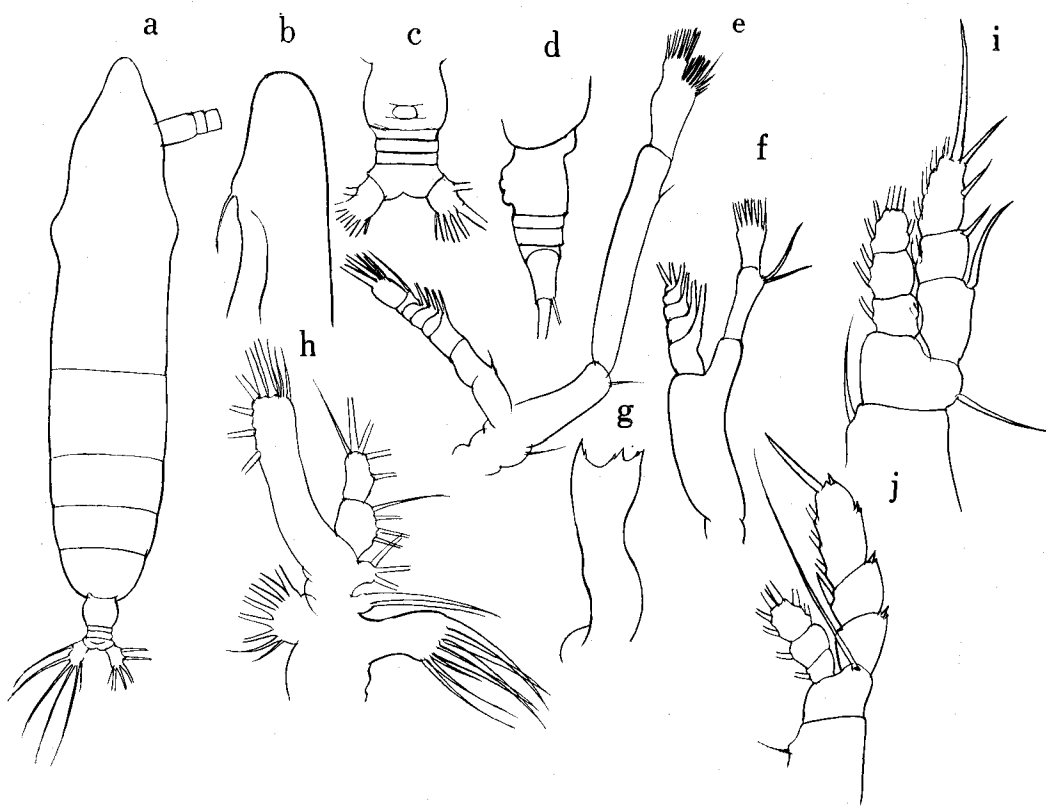
Occurrence. One female from the surface in Sagami, 1937.

Distribution. The species has been recorded from the Atlantic Ocean, Mediterranean Sea, Malay Archipelago and the Arabian Sea. In Japan it has been recorded from warm currents.

Haloptilus longiceps sp. nov.

(Fig. 194, a-j)

Female. Length, 3.02 mm: cephalothorax, 2.66 mm; abdomen, 0.36 mm. The cephalothorax elongate ovate. In dorsal aspect the cephalic segment gradually contracted in front and narrowly rounded at the anterior margin; the lateral margin of the head inflated on the oral region; in lateral view the frontal margin is boldly arched. The lateral corner of the last thoracic segment narrowly

Fig. 194. *Haloptilus longiceps* sp. nov.

Female: dorsal aspect; b, head, lateral aspect; c, abdomen, ventral aspect; d, abdomen, lateral aspect; e, 2nd antenna; f, mandible palp; g, biting blade of mandible; h, 1st maxilla; i, 1st leg; j, 5th leg.

rounded. The rostrum arises apart from the anterior margin of the head; the filaments slender.

The abdomen 4-jointed; the segments and furca are in the proportional lengths as 44:7:5:20:24=100. The genital segment about as long as wide; the ventral surface of the segment is not smooth; there is a sudden change in outline below the genital swelling; a faint transverse line is observed across

the segment. The furcal rami 4 times as long as wide; the appendicular seta feeble.

The 1st antenna exceeds the end of the furca by distal 4 segments; the segments are in the following proportional lengths:

Segments.	1	2	3	4	5	6	7	8	9	10	11	12	13	14
	64	21	25	25	25	25	28	31	37	27	43	50	56	59
	15	16	17	18	19	20	21	22	23	24	25			
	56	59	62	59	56	47	47	43	47					

the segments 16, 17 and 18 are of about equal lengths.

The 2nd antenna has a slender endopod, about 2 times as long as the 8-jointed exopod; the terminal segment of the exopod has 2 long and 2 short setae. The mandibular palp slender; the endopod slightly longer than the exopod; the biting part simple, furnished with 3 teeth. The 1st maxilla has the following numbers of setae in various parts: the 1st inner lobe has 7 setae; the 2nd inner lobe has 1 long and 1 short seta; the 3rd inner lobe has 3 setae; the 2nd basal segment has 4 setae; the endopod has 5 setae; the exopod has 9 setae, of which the apical 2 are long; the outer lobe has 8 setae. The 2nd maxilla and maxilliped as those of *H. longicornis*; the proportional lengths of the segments of the maxilliped are as follows: 35:27:10:10:8:8:3.

In the 1st leg the outer edge spine on the 1st segment of the exopod reaches the base of the 1st outer marginal spine on the 3rd segment of the exopod. The 2nd to 4th legs have each 3-jointed exopod and endopod and have no interesting features.

The 5th pair of legs feeble; the inner marginal spine on the 2nd segment of the exopod short; the seta on the 2nd basal segment long, reaching the distal end of the terminal spine of the exopod.

Remarks. The species is distinguished from the hitherto known species by the elongated head and by the structure of the mandible and 1st maxilla.

Occurrence. One female from Sagami, November, 1937 from depths 1000-0 m.

Distribution. The Pacific coast of Middle Japan.

Genus *Euaugaptilus* SARS.

SARS created a genus *Euaugaptilus* to accomodate a number of species that had previously been refered to *Augaptilus* GIESBRECHT on the grounds that in the latter genus the mandible and 1st maxilla are greatly reduced, whereas, in the former they are more perfectly deveoloped. SEWELL (1932) drew attention to the fact that in the genus *Euaugaptilus* there should be still further subdivision, if not into actual new genera, at least into 4 groups by the structural differences in the 1st maxilla, mandible and 2nd antenna. He recorded the

occurrence of 11 species from the Indian seas and arranged them into 4 groups :

- Group I. Maxilla of normal type ; endopod and lobes 1, 2, 3, present ; mandibular palp with 2 rami ;

Euaugaptilus nodifrons SARS

Euaugaptilus indicus SEWELL

- Group II. Maxilla shows partial depression, the endopod missing ; lobe 1, 2, 3 ; present ; mandibular palp with 2 rami ;

Euaugaptilus filigerus (CLAUS)

Euaugaptilus laticeps SARS

Euaugaptilus magnus (WOLFENDEN)

Euaugaptilus oblongus SARS

Euaugaptilus tenuispinus SARS

- Group III. Maxilla further reduced ; the endopod and lobe 3 absent ; mandibular palp with 2 rami ;

Euaugaptilus angustus SARS

Euaugaptilus facilis (FARRAN)

- Group IV. Maxilla reduced ; endopod and lobes 2, 3 absent ; endopod of mandibular palp reduced or absent ;

Euaugaptilus hecticus (GIESBRECHT)

Euaugaptilus latifrons SARS

A. SCOTT (1909) recorded the occurrence of *E. bullifer* (GIESBRECHT), *E. filligerus*, *E. hecticus*, *E. longicaudatus* (CLAUS), *E. palumboi* (GIESBRECHT), *E. platicus* A. SCOTT and *E. validus* (A. SCOTT) from the Malay Archipelago, of which the last two species are synonyms of *E. laticeps* SARS and *E. magnus* (WOLFENDEN) respectively.

No species have been recorded from the Japanese waters until the following species were found from the Izu region :

- Group I. *Euaugaptilus nodifrons* SARS

Euaugaptilus farrani SARS

- Group II. *Euaugaptilus laticeps* SARS

Euaugaptilus filligerus (CLAUS)

Euaugaptilus magnus (WOLFENDEN)

Euaugaptilus oblongus SARS

- Group III. *Euaugaptilus angustus* SARS

Euaugaptilus mixtus BRODSKY

Euaugaptilus nudus sp. nov.

Euaugaptilus facilis (FARRAN)

Euaugaptilus marginatus sp. nov.

Euaugaptilus palumboi (GIESBRECHT)

Group IV. *Euaugaptilus bullifer* (GIESBRECHT)

Euaugaptilus longimanus SARS

Euaugaptilus hecticus (GIESBRECHT)

Euaugaptilus rigidus SARS

Euaugaptilus nodifrons SARS.

(Fig. 195, a-g)

Euaugaptilus nodifrons, SARS, 1925, p. 267, pl. lxxxii; SEWELL, 1932, p. 316, text-fig. 104, a-j; 1947, p. 205, text-fig. 53, A-E; WILSON, 1950, p. 206.

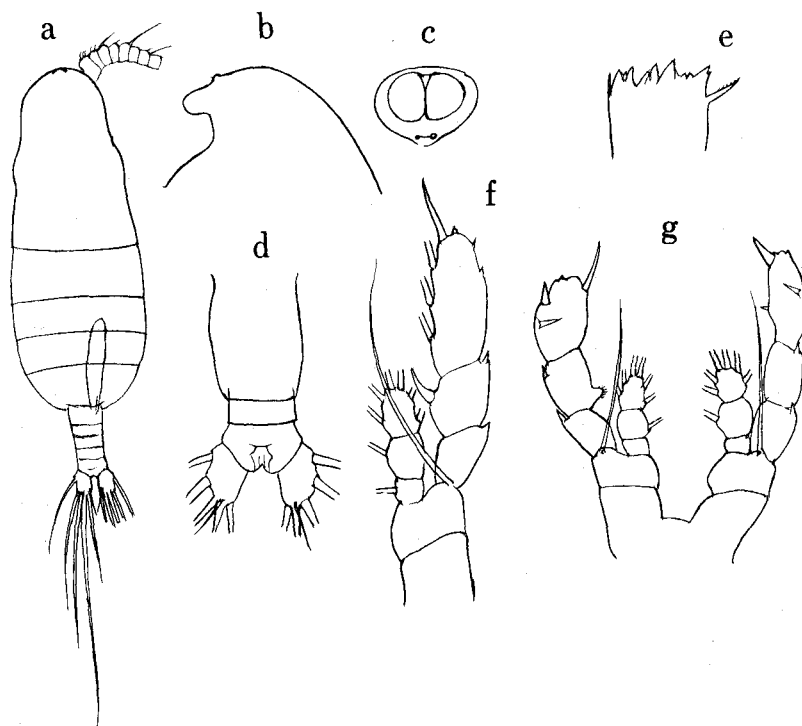


Fig. 195. *Euaugaptilus nodifrons* SARS.

Female: a, dorsal aspect; b, head lateral aspect; c, rostrum, frontal view; d, abdomen, dorsal aspect; e, biting blade of mandible; f, 5th leg. Male: g, 5th pair of leg.

Female. Length, 5.47 mm; cephalothorax, 4.40 mm; abdomen, 1.07 mm. The abdomen is contained 4.1 times in the length of the cephalothorax. The cephalothorax oblong ovate. The cephalic segment is longer than the combined lengths of the thoracic segments. The lateral corner of the last thoracic segment rounded. The rostrum is represented by a knob; the rostral filaments absent.

The abdomen 3-jointed; the segments and furca are in the proportional lengths as $52:10:10:27=100$ measured along the lateral margin. The furcal rami as long as wide.

The 1st antenna extends to the distal end of the furca. The mouth parts as those of the male.

In the 5th pair of legs the inner marginal spine of the 2nd segment of the exopod about $1/4$ the length of the 3rd segment of the exopod.

Male. Length, 6.32 mm: cephalothorax, 5.00 mm; abdomen, 1.32 mm. General appearance as in the female. The abdomen 5-jointed; the segments and furca are in the proportional lengths as $25:14:11:9:25:16=100$. The furcal rami as wide as long.

The right 1st antenna 25-jointed, extends about to the end of the furca. The left antenna is modified into a grasping organ; the segments 19 to 21 are fused and so are the segments 22 with the 23. The 2nd antenna has the endopod 2.6 times as long as the exopod; the exopod 7-jointed; the 1st segment of the endopod narrow at the proximal. The mandible has the exopod 1.2 times as long as the endopod; the biting part well developed. The 1st maxilla has 9 setae on the 1st inner lobe; the 2nd and 3rd inner lobes have each a single seta; the endopod has 2 short setae; the exopod has 2 long and 1 short seta; the outer lobe has 6 long setae. In the 2nd maxilla the setae on the lobes are furnished densely with short spinules. The maxilliped very long; the proportional lengths of the segments are as $50:60:30:22:15:17:5$.

The 1st to 5th legs agrees well with the description given by previous authors.

Remarks. The male specimen is larger in size than those reported by SEWELL which measured 4.8 and 5.75 mm. SARS' female specimen measured 5.4 mm in total length.

Occurrence. 8 females and 2 males from deep waters of Sagami Bay.

Distribution. The species has been recorded from the North Atlantic and Indian Oceans.

Euaugaptilus farrani SARS.

(Fig. 196, a-e)

Euaugaptilus farrani SARS, 1925, p. 288, pl. xcvi.

Female. The specimen was much mutilated; but the mouth parts and swimming legs were preserved in good condition. The 2nd antenna has the 8-jointed exopod which is about as long as the endopod. The mandible has the exopod about as long as the endopod; the exopod carries 5 setae; the biting part has 4 teeth and a seta. The 1st maxilla agrees well with SARS' figure; the masticatory lobe well developed; the 2nd and 3rd inner lobes present; the 2nd

basal segment has 3 setae of which 2 are longer than the rest; the endopod has 2 short setae; the exopod has 6 setae of which the apical 2 are long; the outer lobe has 8 setae of which 2 are very short. The 2nd maxilla has 6 lobes; Sars overlooked the 1st lobe bearing 3 setae and a minute spine; the setae on the distal segments have no "buttons". The maxilliped just as figured by Sars.

The 1st to 4th swimming legs agree well with Sars' figures. In the 5th pair

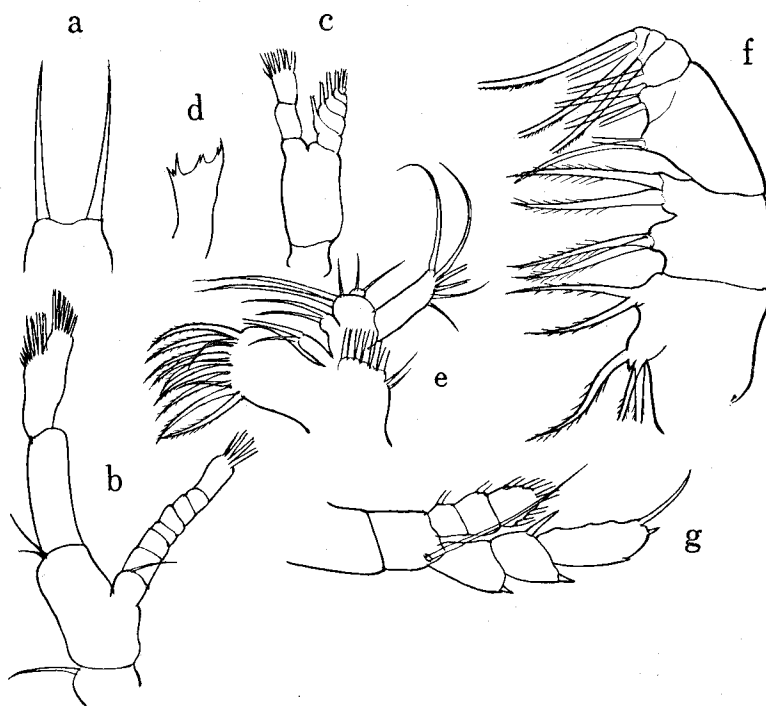


Fig. 196. *Euaugaptilus farrani* Sars.

Female: a, rostrum; b, 2nd antenna; c, mandible palp; d, biting blade of mandible; e, 1st maxilla; f, 2nd maxilla; g, 5th leg.

of legs the inner edge spine of the 2nd segment of the exopod short, not attaining the base of the 2nd inner marginal setae of the 3rd segment of the exopod.

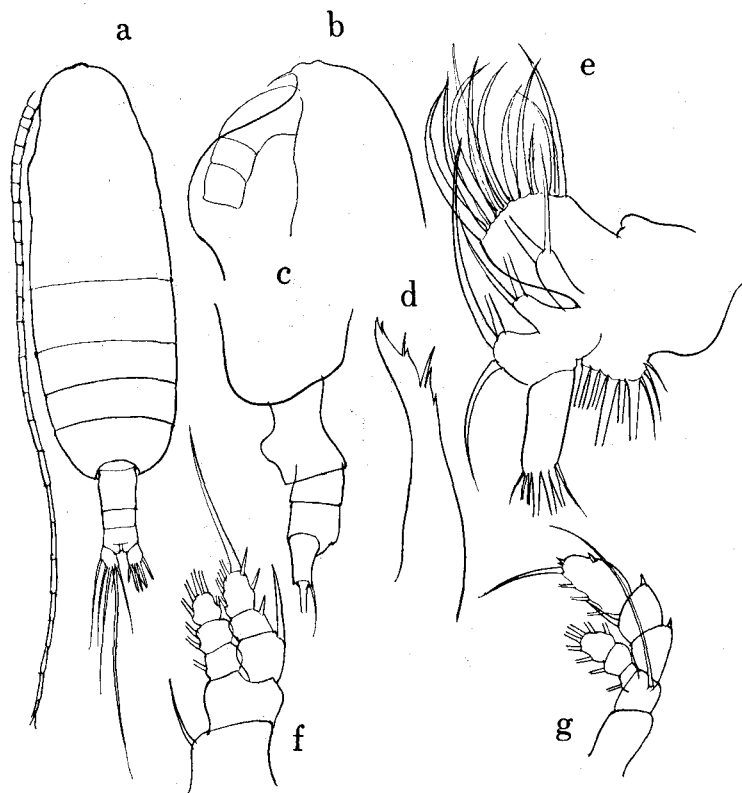
Occurrence. A mutilated female specimen from Suruga Bay from depths 1800–1000 m.

Distribution. The species has been recorded from the temperate Atlantic from depths 4000–0 m. The species has neither been recorded from the Indian Ocean nor from the Arabian Sea.

Euaugaptilus laticeps Sars.

(Fig. 197, a-g)

Augaptilus laticeps, Sars, 1905, p. 11; Farran, 1908, p. 72; *Augaptilus antarcticus*, Wolfenden, 1911, p. 334, pl. xxxvi; *Augaptilus platicus*, A. Scott, 1909, p. 137, pl. 42; *Euaugaptilus laticeps*, Sars, 1925, p. 264, pl. lxxx; Farran, 1926, p. 289; 1929, p. 269; Sewell, 1947, p. 209, text-figs. 55, 56; Wilson, 1950, p. 205; Vervoort, 1957, p. 139, p. 131.

Fig. 197. *Euaugaptilus laticeps* Sars.

Female: a, dorsal aspect; b, head, lateral aspect; c, last thoracic segment and abdomen, lateral aspect; d, biting blade of mandible; e, 1st maxilla; f, 1st leg; g, 5th leg.

Female. Length, 7.43 mm: cephalothorax, 6.00 mm; abdomen, 1.43 mm. The cephalothorax elongate ovate; in lateral view the oral region much vaulted. The rostral filaments fine and short.

The abdomen 3-jointed, contained 4.2 times in the length of the cephalothorax; the segments and furca are in the proportional lengths as 44:17:14:25=100. The genital segment produced below. The furcal rami as long as wide.

The 1st antenna exceeds the end of the furca by distal 6 segments; the segments 12 and 20 are each dark-brownly coloured. The 2nd antenna has the endopod 1.5 times as long as the 8-jointed exopod. In the mandible the biting part slender; the teeth are obliquely arranged; the exopod slightly larger than the endopod. The 1st maxilla has the following numbers of the setae on the various appendages: 9 on the outer lobe, 7 on the exopod, 3 on the 2nd basal, 2 on the 3rd inner lobe, 2 on the 2nd inner lobe, of which the one is stout and long; 10 on the 1st inner lobe. The 2nd maxilla has the following numbers of setae on the 1st to 6th lobes: 3 on the 1st, 2 on the 2nd, 2 on the 3rd, 3 on the 4th, 2 on the 5th, 3 on the 6th, 7 on the endopod. The maxilliped has the segments in the proportional lengths 50:41:18:11:9:7:4.

The 1st to 5th legs have each 3-jointed exopod and endopod. The 1st leg has the outer edge spine on the 1st segment of the exopod reaching the apex of the proximal outer marginal spine of the 3rd segment of the exopod. The 5th pair of legs has an inner marginal spine on the 2nd segment of the exopod reaching the base of the 2nd inner marginal seta of the 3rd segment of the exopod.

Remarks. The specimen is easily recognized by the peculiar shape of the cephalic segment. Sars' specimen from the Atlantic measured 7.6 mm in total length in the female, and that of Sewell from the Arabian Sea measured 8.3 mm in the female. A. Scott's specimen measured about 10.0 mm in the female.

Occurrence. 1 female from Suruga from depths 1000–0 m.

Distribution. The specimen has a fairly wide distribution and has been recorded from the North Atlantic Ocean, Indian seas, Malay Archipelago and from the Arabian Sea.

Euaugaptilus filligerus (CLAUS).

(Fig. 198, a–j)

Augaptilus filligerus, GIESBRECHT, 1892, p. 400, t. 3, fig. 3; t. 27, fig. 34; t. 28, fig. 10, 13, 14, 20, 26, 27, 36; t. 39, fig. 49; A. SCOTT, 1909, p. 136; WOLFENDEN, 1911, p. 341; *Euaugaptilus filligerus*, Sars, 1925, p. 279, pl. xc; FARRAN, 1929, p. 269; SEWELL, 1932, p. 321; FARRAN, 1936, p. 114; WILSON, 1950, p. 205.

Female. Length, 5.02 mm: cephalothorax, 4.14 mm; abdomen, 0.88 mm. The cephalothorax slender in dorsal aspect. The abdomen is contained 4.1 times in the length of the cephalothorax. The cephalic segment is narrow and is longer than the thoracic segments taken together; the frontal margin of the head vaulted in lateral aspect. The postero-lateral corner of the last thoracic segment narrowly rounded. The rostral filaments slender.

The abdomen 3-jointed; the segments and furca are in the proportional lengths as 53:13:8:26=100. The genital segment swollen below with scattered hairs on the apex. The furcal rami as long as wide.

The 1st antenna 25-jointed, extends beyond the end of the furca by distal 7 segments; the segments 2, 7, 9, 10, 18, 21 and 25 are each furnished with a long plumose seta. The 2nd antenna has a slender endopod which is 2.4 times as long as the exopod. The mandible has the exopod a little longer than the

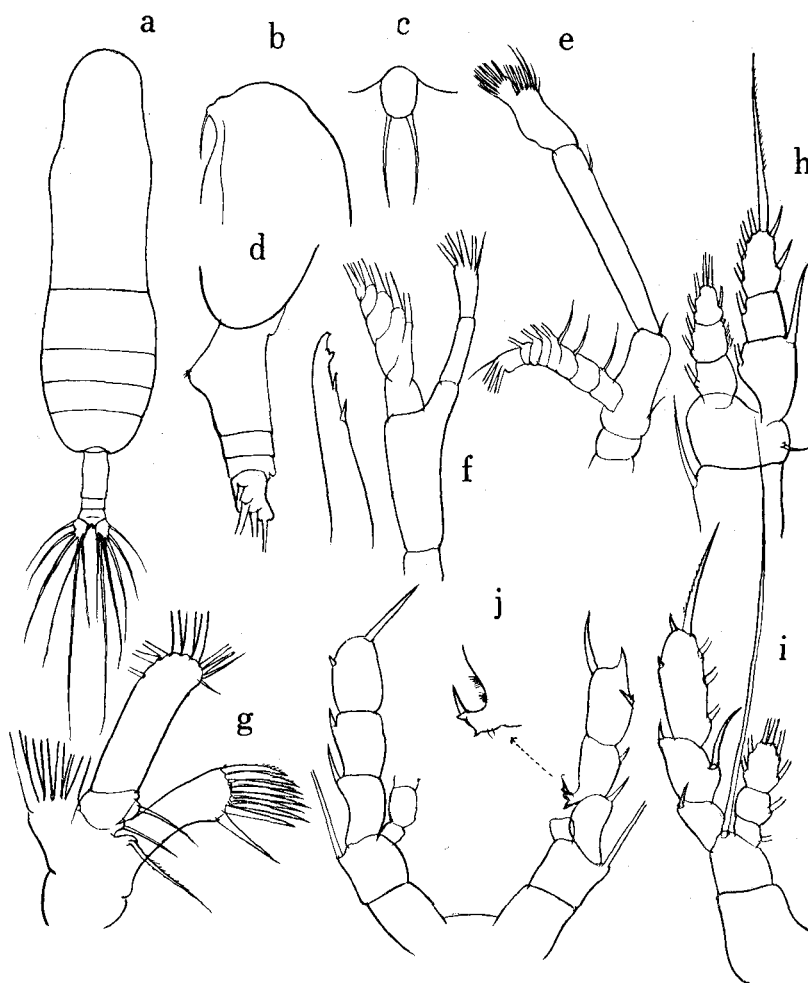


Fig. 198. *Euaugaptilus filigerus* (CLAUS).

Female: a, dorsal aspect; b, head, lateral aspect; c, rostrum; d, last thoracic segment and abdomen, lateral aspect; e, 2nd antenna; f, mandible; g, 1st maxilla; h, 1st leg; i, 5th leg. Male: j, 5th pair of legs.

endopod (16:14); the biting part obliquely arranged. The 1st maxilla agrees fairly well with GIESBRECHT's figure and has the following numbers of setae on the various appendages: the exopod bears 10 setae, of which the distal 3 very long; the outer lobe bears 6 long setae; the 2nd basal has a single seta; the 1st inner

lobe has 9 spines; the 2nd and 3rd lobes have each a single seta. The 2nd maxilla bears 1 seta on the 1st lobe; 1 seta on the 2nd lobe; 2 setae on the 3rd lobe; 3 setae on the 4th; 2 setae on the 5th; 3 setae on the 6th; 7 setae on the endopod. The maxilliped has the segments in the proportional lengths as 27:33:11:9:7:4:2.

The 1st to 5th legs as described and figured by previous authors.

Male. Length, 4.14 mm: cephalothorax, 3.45 mm; abdomen, 0.69 mm. General appearance as in the female. The abdomen 5-segmented; the segments and furca are in the proportional lengths as 26:16:13:11:18:16=100. The furcal rami as wide as long.

The right 1st antenna exceeds the end of furca by about 4 or 5 distal segments. The grasping antenna on the left side; the segments 19 to 21 are fused; and so are the segment 22 with the 23.

The mouth parts and swimming legs as those of the female.

The 5th pair of legs has 3-jointed exopod and endopod; in the right leg the 2nd segment of the exopod has a characteristic process on the proximal inner margin.

Remarks. The another female specimen measured 7.59 mm; SARS' specimen measured 6.80 mm in the female; SEWELL's specimen from the Indian seas measured 6.60 mm; the specimen of "Terra Nova" measured 5.75 mm.

Occurrence. 3 females and 1 male from Sagami from depths 1000-0 m.

Distribution. The species has a wide distribution in the great oceans and also in the Mediterranean Sea and the Pacific coast of Middle Japan.

Euaugaptilus magnus (WOLFENDEN).

(Fig. 199, a-g)

Augaptilus magnus, WOLFENDEN, 1904, p. 122; FARRAN, 1908, p. 77; WOLFENDEN, 1911, p. 341;
Euaugaptilus magnus, SARS, 1925, p. 262, pl. lxxix, figs. 1-16; SEWELL, 1932, p. 322;
WILSON, 1950, p. 206; VERVOORT, 1957, p. 139.

Female. Length, 7.92 mm: cephalothorax, 6.20 mm; abdomen, 1.72 mm. The cephalothorax robust, about half as wide as long. The frontal distal margin of the head produced anteriorly. The postero-lateral corner of the last thoracic segment broadly rounded. The rostrum consists of a blunt process; filaments absent.

The abdomen 3-jointed the segments and furca are in the proportional lengths as 55:15:9:21=100. The lateral margins of the genital segment parallel; the ventral surface of the genital segment produced below with scattered hairs on the genital area; the ventral distal margin of the segment is furnished with a small tuft of hairs. The furcal rami much wider than long.

The 1st antenna exceeds the end of the furca by terminal 3 segments. The 2nd antenna has the endopod 1.4 times as long as the 8-jointed exopod. The

mandible has the exopod and endopod of about equal lengths; the endopod has 6 setae on the 2nd segment. The 1st maxilla agrees exactly with WOLFENDEN's figure; the outer lobe has 3 short setae and 5 long ones, of which the 2nd outer one is very long; the 2nd and 3rd inner lobes have each a single seta. The 2nd maxilla has the following numbers of setae on the various lobes: 3 on the

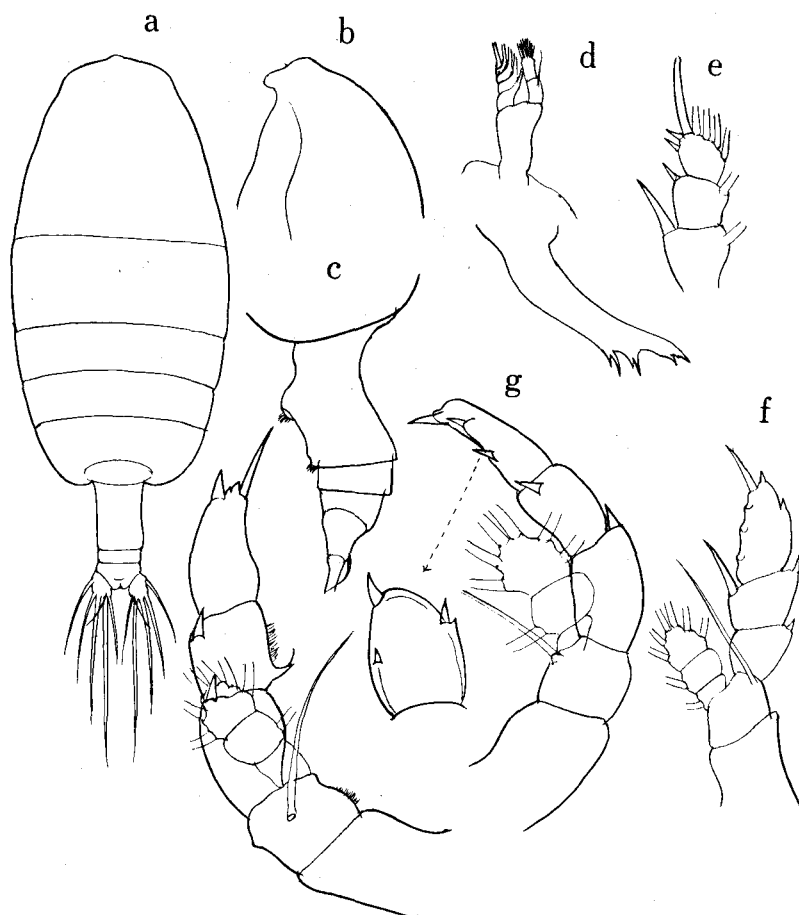


Fig. 199. *Euaugaptilus magnus* (WOLFENDEN).

Female: a, dorsal aspect; b, head, lateral aspect; c, last thoracic segment and abdomen, lateral aspect; d, mandible; e, exopod of 1st leg. Male: g, 5th pair of legs.

1st, 1 on the 2nd, 2 on the 3rd lobe, 3 on the 4th, 2 on the 5th, 3 on the 6th, 7 on the endopod. The maxilliped has the 1st and 2nd basal segments of about equal lengths. The setae on the 2nd maxilla and maxilliped have "buttons".

The 1st leg has 3-jointed exopod and endopod; the outer edge spine on the 1st segment of the exopod reaches the distal margin of the 2nd segment of the

exopod; the outer marginal spine of the 2nd basal segment absent. The 2nd to 4th legs have each 3-jointed exopod and endopod.

The 5th pair of legs has 3-jointed exopod and endopod; the inner marginal spine of the 2nd segment of the exopod about $2/3$ the length of the 3rd segment of the exopod.

Male. Length, 7.75 mm. General appearance as in the female. The abdomen is contained 3.4 times in the length of the cephalothorax. The abdominal segments and furca are in the proportional lengths as $26:17:15:11:9:22=100$. The furcal rami wider than long.

The right 1st antenna extends to the end of the furca. The grasping antenna on the left. The mouth parts and swimming legs as in the female.

In the right 5th leg the terminal spine of the 3rd segment of the exopod about $2/3$ the length of the 3rd segment of the exopod. The distal segment of the exopod of the left leg is oval in shape bearing 3 marginal spines. The 2nd basal segment of both legs are furnished with scattered hairs on the inner margin.

Occurrence. 4 females and 1 male from Sagami from depth 1000 m to the surface.

Distribution. The species has been recorded from the North Atlantic and Indian seas and also from the Antarctic.

Euaugaptilus oblongus Sars.

(Fig. 200, a-f)

Augaptilus oblongus, Sars, 1905, p. 11; *Euaugaptilus oblongus*, Sars, 1925, p. 266, pl. lxxxii, figs. 1-16; SEWELL, 1932, p. 322; 1947, p. 218, Text-fig. 58, A-F; WILSON, 1950, p. 206.

Female. Length 6.06 mm: cephalothorax, 4.75 mm; abdomen, 1.31 mm. The cephalothorax oblong ovate. The cephalic segment as long as the thoracic segments taken together. The lateral corner of the last thoracic segment broadly rounded. The rostrum consists of 2 short prominences.

The abdomen 3-jointed; the segments and furca are in the proportional lengths as $48:12:17:23=100$ measured along the lateral margin. The genital segment produced below, bears fine hairs on the apex of the swelling. The furcal rami about as long as wide.

The 1st antenna 25-jointed, exceeds the end of the furca by last 2 segments. The 2nd antenna has the endopod 1.5 times as long as the exopod which is composed of 7 free segments. The mandible has the exopod slightly longer than the endopod; the biting part has 3 teeth; the exopod has 5 marginal setae; the endopod has 6 setae on the distal segment. The 1st maxilla has 9 setae on the outer lobe, 2 on the exopod, 2 on the 2nd basal, 2 on the 3rd inner lobe, a single seta on the 2nd inner lobe, 9 spines on the 1st inner lobe. The 2nd

maxilla and maxilliped just as figured by Sars.

In the 5th pair of legs the inner marginal spine of the 2nd segment of the exopod more than half the length of the 3rd segment of the exopod.

Remarks. Sars' specimen is larger in size measuring 7.40 mm. Sewell's specimen from the Arabian Sea measured 6.15 mm and has a single seta on the 2nd basal segment of the 1st maxilla, whereas, the present specimen and Sars' specimens have each 2 setae on the same segment.

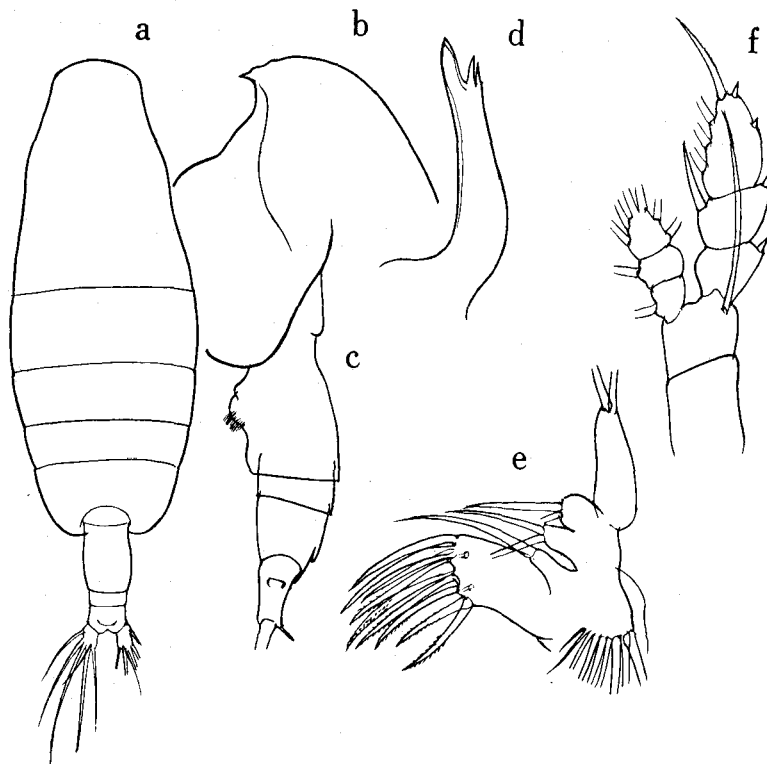


Fig. 200. *Euaugaptilus oblongus* Sars.

Female: a, dorsal aspect; b, head lateral aspect; c, last thoracic segment and abdomen, lateral aspect; d, biting blade of mandible; e, 1st maxilla; f, 5th leg.

Occurrence. 2 females from Suruga from depth 1260 m to the surface.

Distribution. The species has been recorded from the North Atlantic, the Indian seas and also from the Arabian Sea.

Euaugaptilus angustus Sars.

(Fig. 201, a-j)

Augaptilus angustus, Sars, 1905, p. 10; *Euaugaptilus angustus*, Sars, 1925, p. 281, pl. xci, figs. 1-14; SEWELL, 1932, p. 322; 1947, p. 222, Text-fig. 60, E; WILSON, 1950, p. 204.

Female. Length, 6.47 mm: cephalothorax, 5.45 mm; abdomen, 1.02 mm. The cephalothorax elongate ovate. The frontal margin of the head rounded when viewed from the dorsal. The postero-lateral margin of the last thoracic segment narrowly rounded. The rostrum is represented by a prominence.

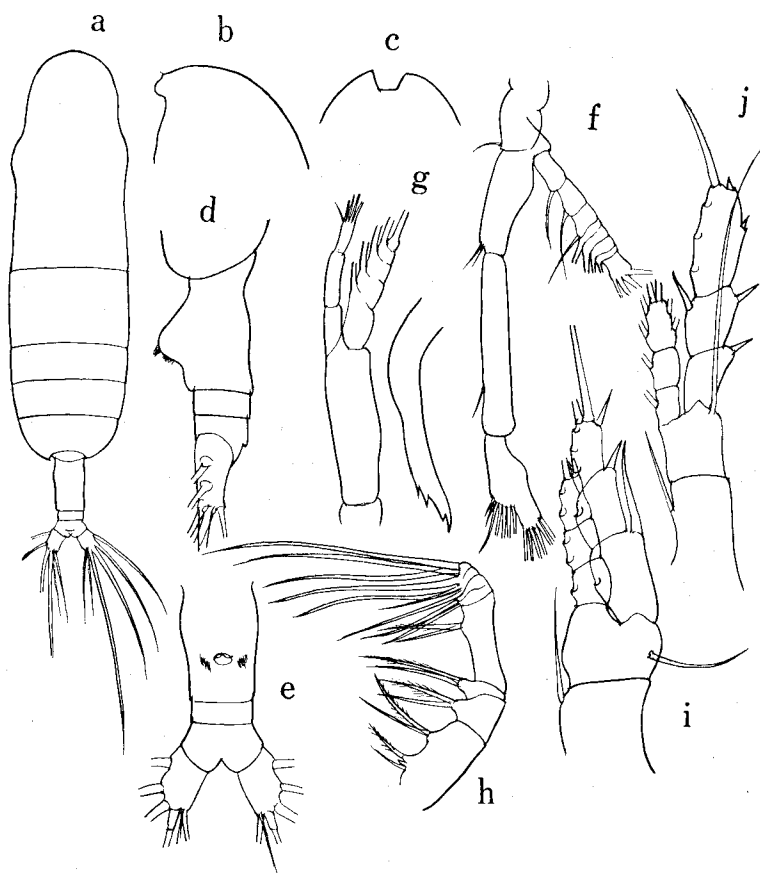


Fig. 201. *Euaugaptilus angustus* Sars.

Female: a, dorsal aspect; b, head, lateral aspects; c, labrum; d, last thoracic segment and abdomen, lateral aspect; e, abdomen, ventral aspect; f, 2nd antenna; g, mandible; h, 2nd maxilla; i, 1st leg; j, 5th leg.

The abdomen 3-jointed; the segments and furca are in the proportional lengths as 53:9:11:27=100. The genital segment swollen below and carries fine hairs on each side of the genital opening. The furcal rami about as long as wide; the appendicular seta fairly long.

The 1st antenna 25-jointed, exceeds the end of the furca by terminal 9

segments. The 2nd antenna has 8-jointed exopod; the endopod about 2 times as long as the exopod; according to Sars the exopod and endopod are of about equal lengths. The mandible has a slender endopod slightly shorter than the exopod which carries 5 setae; the endopod bears 5 setae on the distal segment. The 1st maxilla has 4 setae on the outer lobe, 8 setae on the exopod, 3 on the 2nd basal, the 3rd inner lobe absent, a single seta on the 2nd inner lobe, 10 spines on the 1st inner lobe. The 2nd maxilla has 2 setae and a small spine on the 1st lobe, 2nd to 6th lobes have each 2 setae, the endopod has 7 setae. The maxilliped has the segments in the following proportional lengths: 37:33:11:8:7:5:3. The setae on the 2nd maxilla and maxilliped have no "buttons".

The 1st leg has 3-jointed exopod and endopod; the outer edge spine of the 1st segment of the exopod reaches the distal end of the outer edge spine of the 2nd segment of the exopod.

The 5th pair of legs slender; the 1st basal segment has an inner marginal seta; the inner marginal seta of the 2nd segment of the exopod short and slightly curved.

Remarks. The specimen, though much smaller in size than that reported by Sars (7.90 mm) agrees quite well with the description and figures given by him with the exception of the long endopod of the 2nd antenna in the present specimen.

Occurrence. 1 female from Sagami from depths 1000 m to 0 m.

Distribution. The species has been recorded from the North Atlantic, Indian seas and the Arabian Sea.

Euaugaptilus mixtus BRODSKY.

(Fig. 202, a-j)

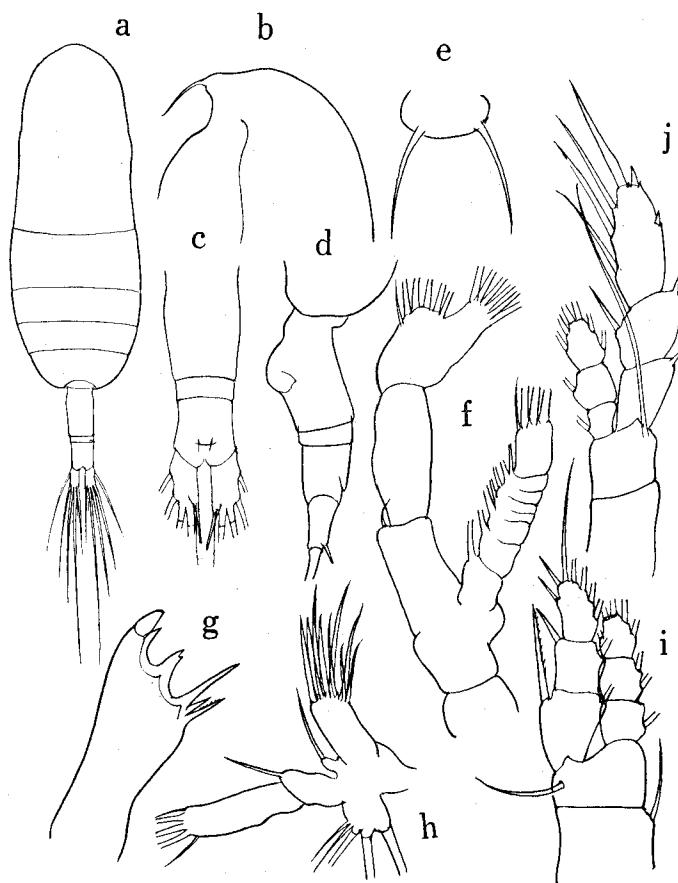
Euaugaptilus mixtus, BRODSKY, 1950, p. 379, text-fig. 268; *E. niveus*, TANAKA, 1953, p. 135.

Female. Length, 4.70 mm: cephalothorax, 3.70 mm; abdomen, 1.00 mm. The cephalothorax oblong ovate. The frontal margin of the head slightly produced in dorsal aspect; in lateral view the anterior margin of the head evenly rounded; the basal part of the rostrum prominent. The lateral corner of the last thoracic segment narrowly rounded and truncates at the ventro-lateral corner. The oral region swollen much below.

The abdomen 3-jointed; the segments and furca are in the proportional lengths as 42:29:22:27=100. The genital segment produced moderately below. The furca slightly asymmetrical; the right side is larger than the left, about 2 times as long as wide. The appendicular seta small.

The 1st antenna 25-jointed, exceeds the end of the furca by distal 4 segments; the segments are in the following proportional lengths:

Segments.	1	2	3	4	5	6	7	8	9	10	11	12	13	14
	44	17	17	20	23	23	27	30	34	37	40	51	54	54
	15	16	17	18	19	20	21	22	23	24	25			
	51	51	54	57	47	47	44	47	44	30	= 1000			

Fig. 202. *Euaugaptilus mixtus* BRODSKY.

Femal: a, dorsal aspect; b, head, lateral aspect; c, abdomen, dorsal aspect; d, last thoracic segment and abdomen, lateral aspect; e, rostrum; f, 2nd antenna; g, biting blade of mandible; h, 1st maxilla; i, 1st leg; j, 5th leg.

The 2nd antenna has the endopod 1.4 times as long as the exopod (32:23); the exopod 8-jointed; the distal segment of the exopod has 4 setae of which the inner marginal one is short. The mandible has the exopod slightly longer than the endopod (8:7); the biting part has 4 strong teeth and a marginal spine. The 1st maxilla has the following numbers of setae on the various lobes: the

outer lobe has 3 long and 2 short setae; the exopod has 3 long setae on the distal margin and a short one on each of the lateral distal margins; the 2nd basal has a single seta; the 2nd inner lobe has a single seta; the 3rd inner lobe absent; the 1st inner lobe has 9 spines. The 2nd maxilla has the following numbers of setae on the various lobes; the 1st lobe has 2 setae and a small spine; the 2nd lobe has 1 seta; the 3rd lobe has 2 setae; the 4th has 3 setae; the 5th has 2 setae; the 6th has 3 setae; the endopod has 7 setae. The maxilliped has the segments in the following proportional lengths: 27:28:11:8:5:4:2. The setae of the 2nd maxilla and maxilliped have no "buttons".

In the 1st leg the 1st segment of the exopod has a long outer edge spine reaching the base of the 1st outer marginal spine of the 3rd segment of the exopod; the spine on the 2nd segment is about as long as the 1st outer marginal spine of the 3rd segment of the exopod. The 2nd to 4th legs have no interesting features.

In the 5th pair of legs the terminal spine of the exopod is 5/6 the length of the 3rd segment of the exopod; the inner edge spine of the 2nd segment is short, reaching only the base of the 1st inner marginal seta of the 3rd segment of the exopod.

Remarks. The present specimen belongs to Group III proposed by SEWELL and closely resembles *E. propinquus* Sars in general appearance. But the numbers of setae on the 2nd basal segment and on the exopod of the 1st maxilla, and those on the 4th and 6th lobes of the 2nd maxilla differ from those of *E. propinquus*. The specimen is identical with *E. niveus* TANAKA listed but undescribed in 1953.

Occurrence. One female from Sagami from depths 1210-0 m.

Distribution. Bering Sea and the Pacific coast of the Middle Japan.

Euaugaptilus nudus sp. nov.

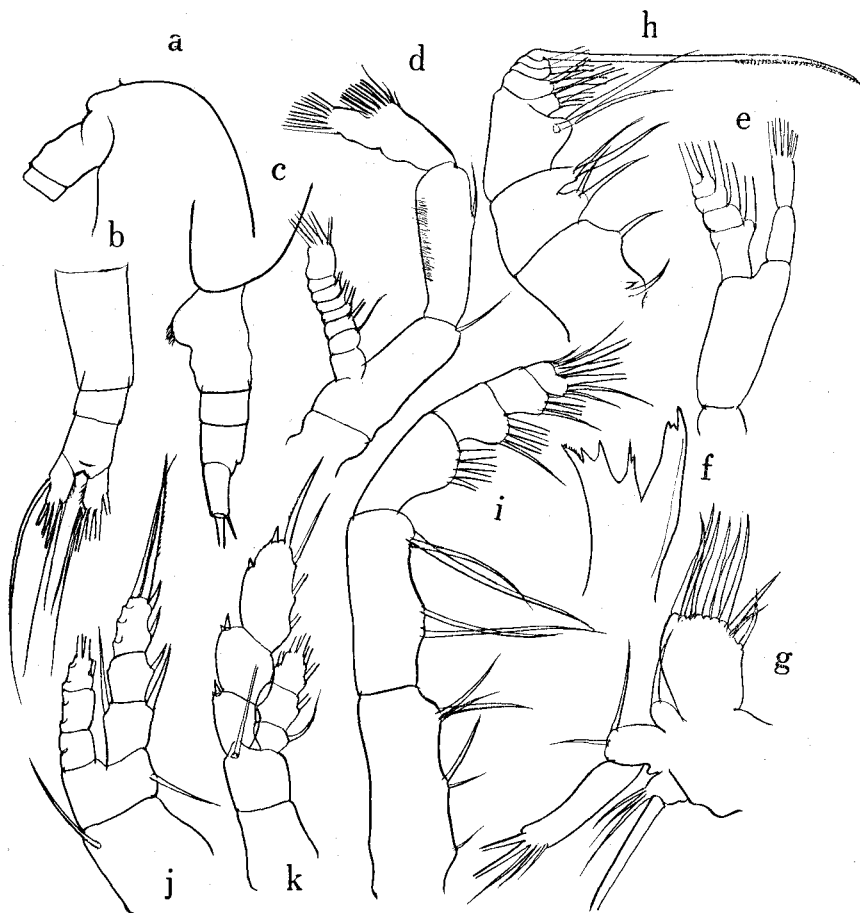
(Fig. 203, a-k)

Female. Length, 4.20 mm: cephalothorax, 3.06 mm; abdomen, 1.14 mm., so that cephalothorax and abdomen are in the proportional lengths as 73 to 27. The cephalothorax elongate ovate. The last thoracic segment narrowly rounded at the distal end. The rostral filaments absent; the frontal organ prominent.

The abdomen 3-jointed; the segments and furca are in the proportional lengths as 46:16:18:20=100 measured along the lateral margin. The genital segment produced considerably below with fine hairs on the apex of the genital swelling. The furcal rami 2.3 times as long as wide.

The 1st antenna extends beyond the end of the furca by distal 3 segments; the segments are in the following proportional lengths:

Segments.	1	2	3	4	5	6	7	8	9	10	11	12	13	14
	96	19	23	23	23	23	23	25	25	31	38	44	48	50
	15	16	17	18	19	20	21	22	23	24	25			
	49	55	57	57	54	38	42	38	46	46	27	=	1000	

Fig. 203. *Euaugaptilus nudus* sp. nov.

Female: a, head, lateral aspect; b, abdomen, dorsal aspect; c, last thoracic segment and abdomen, lateral aspect; d, 2nd antenna; e, mandible palp; f, biting blade of mandible; g, 1st maxilla; h, 2nd maxilla; i, maxilliped; j, 1st leg; k, 5th leg.

The 2nd antenna has the endopod 1.7 times as long as the 8-jointed exopod; the 1st segment of the exopod bears a row of hair-like spines on the outer margin. The mandible has the exopod as long as the endopod; the biting part has a large bicuspid tooth, a slender one and 2 small teeth. The 1st maxilla has 9 serrated spines on the 1st inner lobe; the 2nd inner lobe has a single

seta; the 3rd inner lobe absent; the exopod has 5 setae of which 2 are long; the outer lobe has 4 setae of which the proximal one is very long. The 2nd maxilla has the following numbers of setae on the various lobes: 1 seta and a small spine on the 1st lobe; 1 seta on the 2nd lobe; 2 setae on the 3rd lobe; 2 setae on the 4th lobe; 2 setae on the 5th lobe; 3 setae on the 6th lobe; 9 setae on the endopod. The maxilliped has the segments in the following proportional lengths: 25:25:16:8:5:3:1. Some setae of the 2nd maxilla and maxilliped have "buttons".

The 1st to 5th legs have each 3-jointed exopod and endopod. In the 1st leg the outer edge spine of the 1st segment of the exopod reaches the distal end of the outer edge spine of the 2nd segment of the exopod. In the 2nd leg the terminal spine of the exopod longer than the 3rd segment of the exopod. The 5th pair of legs is very characteristic; the inner marginal spine of the 2nd segment of the exopod entirely absent.

Remarks. The specimen resembles *E. propinquus* Sars in the structure of the maxillae and maxilliped but can be easily distinguished from it by the following characters: the rostral filaments absent; the exopod of the 2nd antenna is much shorter than the endopod; the arrangement of the teeth of the biting part of the mandible; absence of the inner marginal spine on the 2nd segment of the exopod in the 5th pair of legs.

Occurrence. 1 female from Sagami from depth 1000 m to the surface.

Distribution. The Pacific coast of Middle Japan.

Euaugaptilus facilis (FARRAN).

(Fig. 204, a-h)

Augaptilus facilis, FARRAN, 1908, p. 73, pl. III, VIII; WOLFENDEN, 1911, p. 343; *Euaugaptilus facilis*, Sars, 1925, p. 273, pl. lxxxvi, figs. 1-15; SEWELL, 1932, p. 322; 1947, p. 223; WILSON, 1950, p. 204.

Female. Length, 5.78 mm: cephalothorax, 4.50 mm; abdomen, 1.28 mm. The cephalothorax elongate ovate. The frontal margin of the head obtuse in dorsal aspect. The last thoracic segment narrowly rounded on the distal end. The rostral filaments short, arising from a well-marked prominence.

The abdominal segments and furca are in the proportional lengths as 50:11:15:24=100 measured along the lateral margin. The genital segment produced below with a patch of fine hairs on the genital area. The furcal rami 2 times as long as wide. The appendicular seta long, about as long as the combined length of the abdominal segments and furca.

The 1st antenna exceeds the end of the furca by distal 7 segments. The 2nd antenna has the exopod about as long as the endopod; the exopod has 8 free segments. The mandibular palp feeble, has a small exopod and endopod;

the endopod carries 3 terminal setae on the 2nd segment; the exopod 5-jointed, carries 4 setae; the biting part very strong. In the 1st maxilla the endopod and 3rd inner lobe absent; the 1st inner lobe has 8 spines; the 2nd inner lobe has a single long and stout seta; the 2nd basal segment has a slender seta; the endopod is represented by a small process; the exopod has 3 setae; the outer lobe has 3 long and 2 short setae. The 2nd maxilla has the following numbers of setae on the lobes 1 to 6, and endopod: 3 setae and a short spine on the 1st

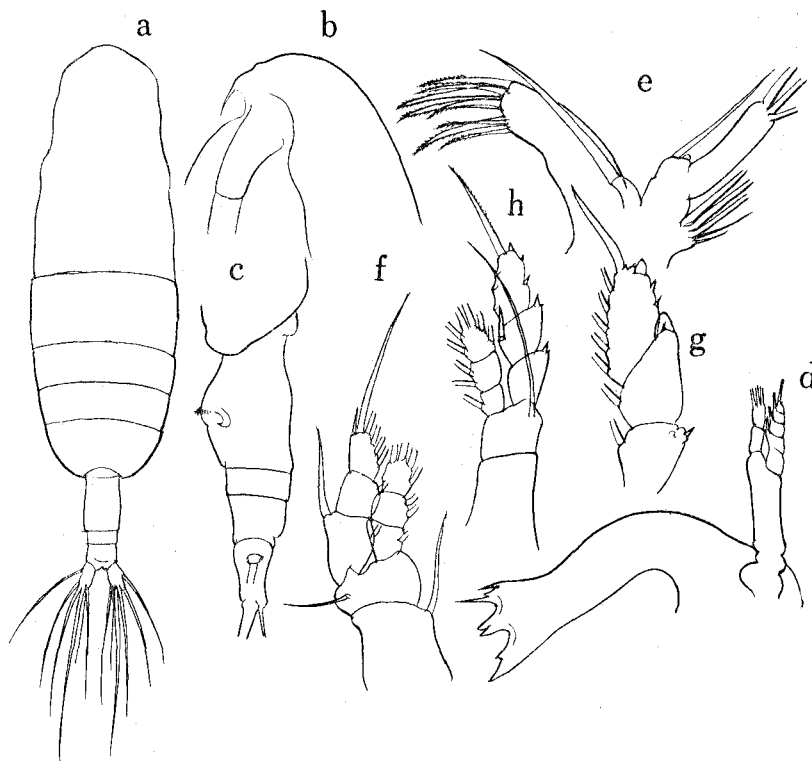


Fig. 204. *Euaugaptilus facilis* Sars.

Female.: a, dorsal aspect; b, head, lateral aspect; c, last thoracic segment and abdomen, lateral aspect; d, mandible; e, 1st maxilla; f, 1st leg; g, exopod of 3rd leg; h, 5th leg.

lobe; 2 setae on the 2nd; 2 setae on the 3rd; 3 setae on the 4th; 2 setae on the 5th; 3 setae on the 6th; 7 setae on the endopod. The maxilliped has the segments in the following proportional lengths: 38:37:12:8:6:4:2.

In the 1st leg the outer edge spine of the 1st segment of the exopod slender and long, exceeding the distal margin of the 3rd segment of the exopod; the 2nd segment of the exopod has no outer edge spines; the 3rd segment has a small outer edge spine. In the 3rd and 4th legs the 2nd segment of the exopod

have each a blunt process overlapping the outer edge spine of the same segment; the 3rd segment of the exopod has a similar process at the base of the distal marginal spine.

In the 5th pair of legs the 3rd segment of the exopod has 3 outer marginal spines; the inner marginal spine of the 2nd segment of the exopod short, reaching the base of the 1st inner marginal seta on the 3rd segment of the exopod.

Remarks. Sars' specimen from the the North Atlantic has only 2 marginal spines on the 3rd segment of the exopod, whereas, in the present specimen the 3rd segment of the exopod of the 5th pair of legs has 3 marginal spines.

Occurrence. 1 female specimen from Sagami Bay from depths 1000-0 m.

Distribution. The species has been recorded from the North Atlantic, Indian seas, and the Arabian Sea.

Euaugaptilus marginatus sp. nov.

(Fig. 205, a-k)

Female. Length, 2.26 mm: cephalothorax, 1.62 mm; abdomen, 0.64 mm. The proportional lengths of the cephalothorax to abdomen are as 72 to 28. The cephalothorax elongate ovate. The frontal margin of the head narrowly rounded when viewed from the dorsal. The last thoracic segment narrowly rounded at the distal end. The rostrum consists of 2 slender filaments.

The abdomen 3-jointed; the segment and furca are in the proportional lengths as 55:12:13:20=100. The genital segment produced moderately below. The furcal rami 2 times as long as wide. The appendicular seta very small.

The 1st antenna 25-jointed, exceeds the end of the furca by distal 8 segments; the distal 2 segments are dark-brownly coloured; the marginal setae of the segments very plumose. The segments are in the following proportional lengths:

Segments.	1	2	3	4	5	6	7	8	9	10	11	12	13	14
	15	10	15	15	17	19	19	24	29	31	36	48	51	53
	15	16	17	18	19	20	21	22	23	24	25			
	55	58	63	65	68	63	61	46	51	44	44	= 1000		

The 2nd antenna has an 8-jointed exopod which is as long as the endopod. The mandible has the exopod as long as the endopod; the exopod has 5 marginal setae; the cutting edge has 4 teeth of which the anterior one is very strong. In the 1st maxilla the outer lobe has 3 long setae; the exopod has 7 setae of which the terminal 2 are very long; the 2nd basal segment has 3 setae; the 3rd inner lobe has a single seta; the 1st inner lobe has 7 spines; the endopod

and 2nd inner lobe absent. The 2nd maxilla is slender and has the following numbers of setae on the lobes 1 to 6 and endopod: 3 setae and a small spine on the 1st lobe; 2 setae on the 2nd; 2 setae on the 3rd; 3 setae on the 4th; 2 setae on the 5th; a seta on the 6th; 7 setae on the endopod. The maxilliped

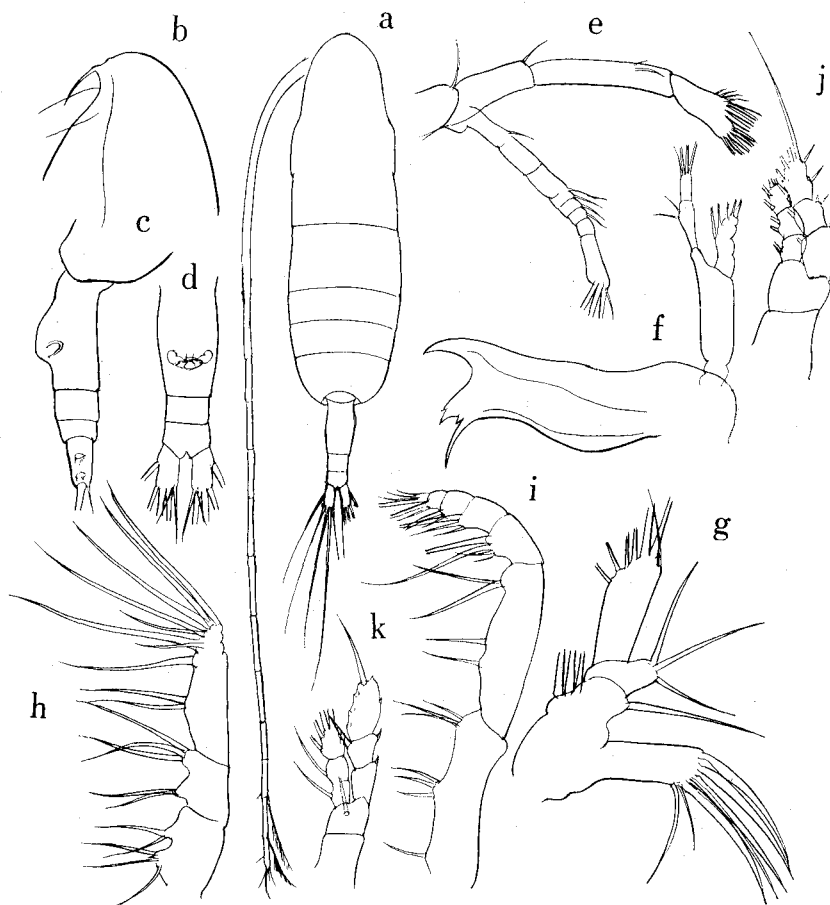


Fig. 205. *Euaugaptilus marginatus* sp. nov.

Female; a, dorsal aspect; b, head, lateral aspect; c, last thoracic segment and abdomen lateral aspect; d, abdomen, ventral aspect; e, 2nd antenna, f, mandible; g, 1st maxilla; h, 2nd maxilla; i, maxilliped; j, 1st leg; k, 5th leg.

has the 1st basal as long as the 2nd; the 2nd basal segment has a row of hair-like spines on the anterior margin.

The 1st leg has 3-jointed exopod and endopod; the outer edge spine of the 1st segment of the exopod extends to the level of the outer marginal spine of the 3rd segment of the exopod; the 2nd segment has a process distal to the

base of the outer edge spine. The 2nd to 4th legs do not show any interesting features.

The 5th pair of legs has 3-jointed exopod and endopod; the inner marginal spine of the 2nd segment of the exopod short, extends a little beyond the base of the inner marginal seta of the 3rd segment of the exopod.

Remarks. The specimen closely resembles *Euaugaptilus hecticus* (GIESBRECHT) but can be easily recognised by the followings: the proportional lengths of the abdominal segments and furca, the long 1st antenna, the long exopod of the 2nd antenna and the structure of the 1st maxilla.

Occurrence. 1 female in a vertical haul from depths 300-100 m in Sagami Bay.

Distribution. The Pacific coast of Middle Japan.

Euaugaptilus palumboi (GIESBRECHT).

(Fig. 206, a-b)

Augaptilus palumboi, GIESBRECHT, 1892, p. 400, t. 28, figs. 15, 17; t. 39, figs. 39, 50; FARRAN, 1908, p. 75; *Euaugaptilus palumboi*, SARS, 1925, p. 302, pl. cv, figs. 9-19; FARRAN, 1926, p. 288; 1936, p. 114; BRODSKY, 1950, p. 374, text-fig. 263; WILSON, 1950, p. 207.

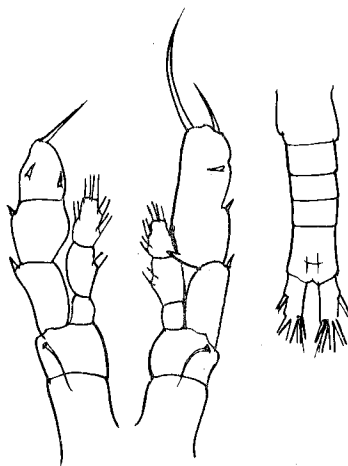


Fig. 206. *Euaugaptilus palumboi* (GIESBRECHT).
Male: abdomen, dorsal aspect; b, 5th pair of legs.

Female. Length, 2.24 mm: cephalothorax, 1.70 mm; abdomen, 0.54 mm. The cephalothorax elongate ovate. The rostrum composed of 2 slender filaments.

The abdominal segments and furca are in the proportional lengths as 42:13:29:16=100. The genital segment produced below. The anal segment longer than wide. The furcal rami 2 times as long as wide.

The 1st antenna extends beyond the end of the furca. The 2nd antenna has

the endopod 1.2 times as long as the exopod. The mandible has the exopod which is about as long as the endopod. The maxillae, maxilliped and 1st to 5th leg as described and figured as by GIESBRECHT.

Male. Length, 1.95 mm: cephalothorax, 1.07 mm; abdomen, 0.88 mm. General appearance as in the female.

The abdominal segments and furca are in the proportional lengths as 20:14:11:10:25:20=100. The furcal rami 2 times as long as wide.

The grasping antenna on the left. The mouth parts and swimming legs as in the female. The 5th pair of legs has 3-jointed exopod and endopod; in the right leg the 2nd and 3rd segments of the exopod fused; the 2nd segment has a process on the inner proximal margin. In the left leg the distal segment of the exopod has a spine on the distal end and 2 spines on the posterior surface of the same segment.

Occurrence. 18 females and 4 males both from Sagami and Suruga Bay. The species is the common one among the species of *Euaugaptilus* in the Izu region.

Distribution. The species has been recorded from the North Atlantic, Pacific, Malay Archipelago and far-eastern seas of the USSR.

Euaugaptilus bullifer (GIESBRECHT).

(Fig. 207, a-i)

Augaptilus bullifer, GIESBRECHT, 1892, p. 400, t. 28, figs. 21, 24; t. 39, fig. 46; FARRAN, 1908, p. 75; A. SCOTT, 1909, p. 135; *Euaugaptilus bullifer*, SARS, 1925, p. 271, pl. lxxxv, figs. 1-16; SEWELL, 1947, p. 231; WILSON, 1950, p. 204.

Female. Length, 4.29. The specimen is not fully matured. The abdomen is contained 3 times in the length of the cephalothorax. The cephalothorax moderately robust; the cephalic segment as long as the thoracic segments taken together. The abdomen 3-jointed; the segments and furca are in the proportional lengths as 45:10:24:21=100. The genital segment swollen moderately below; the anal segment much longer in proportion to that of the adult female. The furcal rami 1.4 times as long as wide.

The 1st antenna exceeds the end of the furca by distal 3 segments. The mouth parts and swimming legs as those of the adult described and figured by GIESBRECHT. The 5th pair of legs has 2-jointed exopod and endopod.

Male. Length, 4.70 mm. The abdominal segments and furca are in the proportional lengths as 21:16:13:13:13:24=100. The furcal rami about 2 times as long as wide.

The left 1st antenna exceeds the end of the furca by distal 5 segments. The 2nd antenna has the endopod 1.7 times as long as the exopod which is composed of 8 free segments. The mandible has 4 teeth on the slender cutting

edge. The 1st maxilla has 4 setae on the outer lobe; 2 setae on the exopod; 1 seta on the basal segment; 3 setae on the 1st inner lobe; the endopod, 2nd and 3rd inner lobes absent. The 2nd maxilla has the following numbers of setae on the 1st to 6th lobes: 1 short seta and a spine on the 1st lobe; 1 seta on the

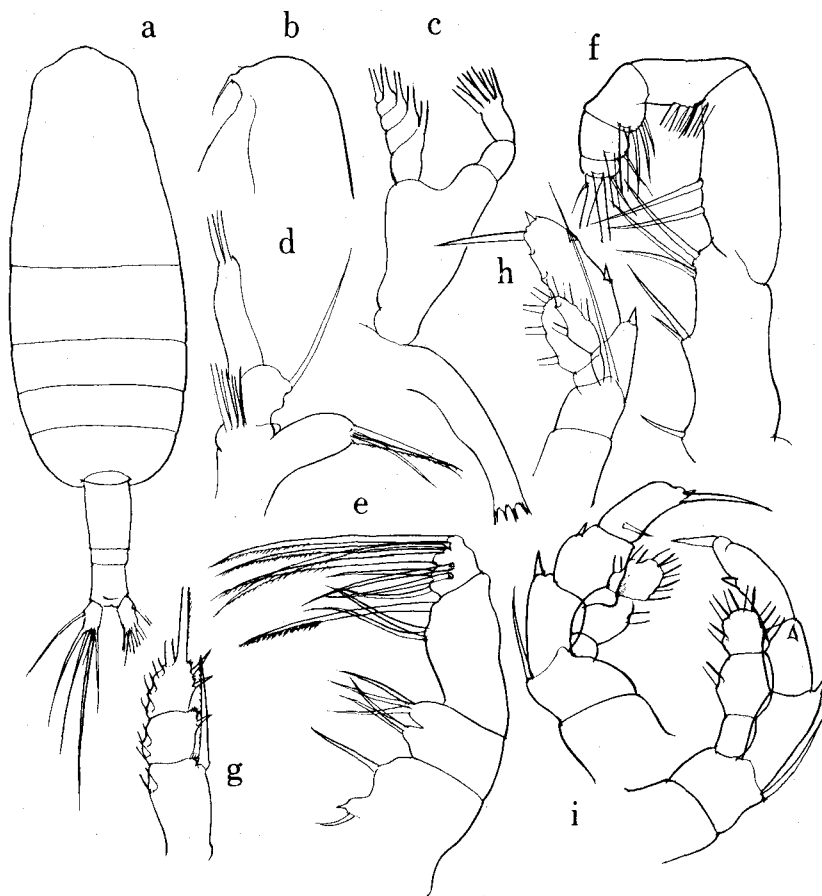


Fig. 207. *Euaugaptilus bullifer* (GIESBRECHT).

Female; a, dorsal aspect; b, head, lateral aspect; c, mandible; d, 1st maxilla; e, 2nd maxilla; f, maxilliped; g, exopod of 1st leg; h, 5th leg. Male: i, 5th pair of legs.

2nd; 2 setae on the 3rd; 3 setae on the 4th; 2 setae on the 5th; 1 seta on the 6th. The maxilliped robust. The setae on the 2nd maxilla and maxilliped are furnished with "buttons".

The 1st leg has 3-jointed exopod and endopod; the outer edge spine of the 1st segment of the exopod long and reaches the distal margin of the 3rd segment of the exopod; the outer marginal spines of the segments of the exopod

are each provided with a small blunt process distal to the base of the outer marginal spine.

The 5th pair of legs is of an usual structure. In the left leg the 2nd segment of the exopod has a blunt process on the inner margin about the middle of the segment.

Remarks. The specimen agrees quite well with the description and figures given by previous authors.

Occurrence. 3 females and 1 male from depths 100–0 m.

Distribution. The species is widely distributed and has been recorded from the North Atlantic, Pacific, Malay Archipelago, the Arabian Sea and the Pacific coast of Middle Japan.

Euaugaptilus longimanus Sars.

(Fig. 208, a–j)

Augaptilus longimanus, Sars, 1905, p. 17; Wolfenden, 1911, p. 340, text-fig. 73, a–c; *Euaugaptilus longimanus*, Sars, 1925, p. 282, pl. xcii; Sewell, 1947, p. 223, text-fig. 60, A–D; text-fig. 61, A–J; 1950, p. 205.

Female. Length, 4.93 mm: cephalothorax, 3.85 mm; abdomen, 1.08 mm. The cephalothorax rather robust in dorsal aspect. The cephalic segment longer than the thoracic segments taken together. The anterior margin of the head obtusely arched in lateral view. The lateral corner of the last thoracic segment narrowly rounded at the distal end. The basal part of the rostrum prominent, composed of 2 short slender filaments.

The abdomen 3-jointed; the segments and furca are in the proportional lengths as 60:12:7:21=100. The furcal rami slightly shorter than wide (7:9); the appendicular seta slender.

The 1st antenna extends beyond the end of the furca by terminal 3 segments. The 2nd antenna has the exopod as long as the endopod; the exopod is composed of 7 free segments; the 2nd basal segment is robust. The mandibular palp small and robust; the endopod is represented by a swelling on the inner distal corner of the palp; according to Sars the endopod carries 2 apical setae but in the present specimen the endopod is represented by a small knob; the biting part has 6 slender teeth; the exopod carries 5 setae. The 1st maxilla reduced; the outer lobe has 5 long setae of which the proximal 2 are very long; the masticatory lobe has 3 spines; the exopod bears 3 setae; the 2nd basal has 2 setae; the 2nd and 3rd inner lobes and endopod absent. The 2nd maxilla as figured by Sars. The maxilliped is very characteristic; the 1st segment of the endopod is very long, longer than the combined combined lengths of the following 4 segments of the endopod.

The 1st leg is interesting; there is a small rounded knob distal to the outer

marginal spines of the 1st and 2nd segments of the exopod and also of the 1st marginal spines of the 3rd segment of the exopod. The 2nd to 4th legs have no noticeable features.

In the 5th pair of legs the inner marginal spine of the 2nd segment of the exopod about half the length of the 3rd segment of the exopod.

Remarks. The specimen is smaller in size than that described by Sars and differs in the structure of the mandible from that described and figured by Sars.

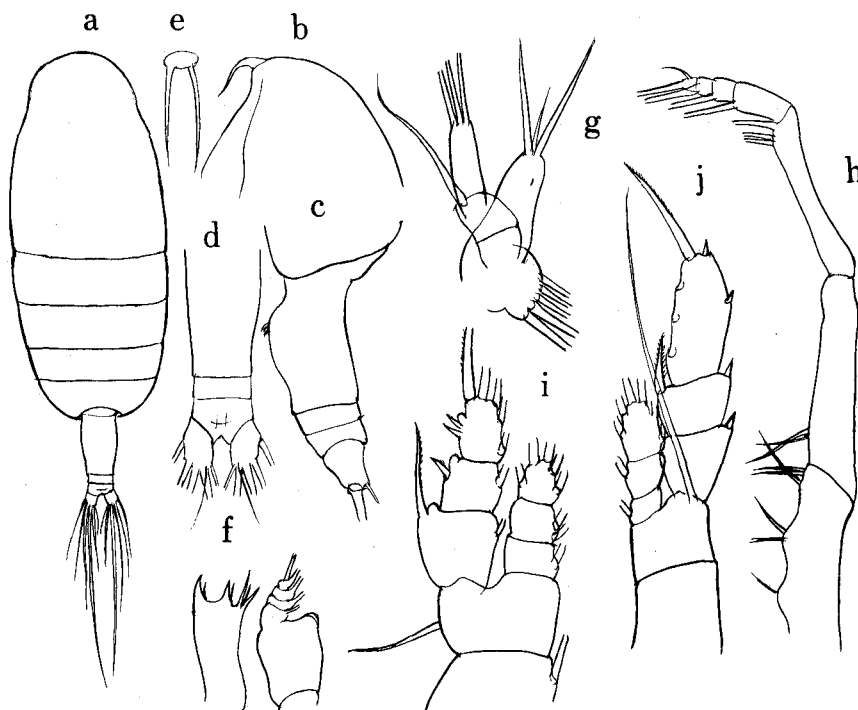


Fig. 208. *Euaugaptilus longimanus* Sars.

Femal: a, dorsal aspect; b, head, lateral aspect; c, last thoracic segment and abdomen lateral aspect; d, abdomen, dorsal aspect; e, rostrum; f, mandible; g, 1st maxilla; h, maxilliped; i, 1st leg; j, 5th leg.

SEWELL (1947) transferred the species from Group IV into Group III by the grounds that the specimen has an inner lobe in the 1st maxilla. However, according to Sars the 2nd inner lobe is absent in *longimanus*, and it is the same in present specimen.

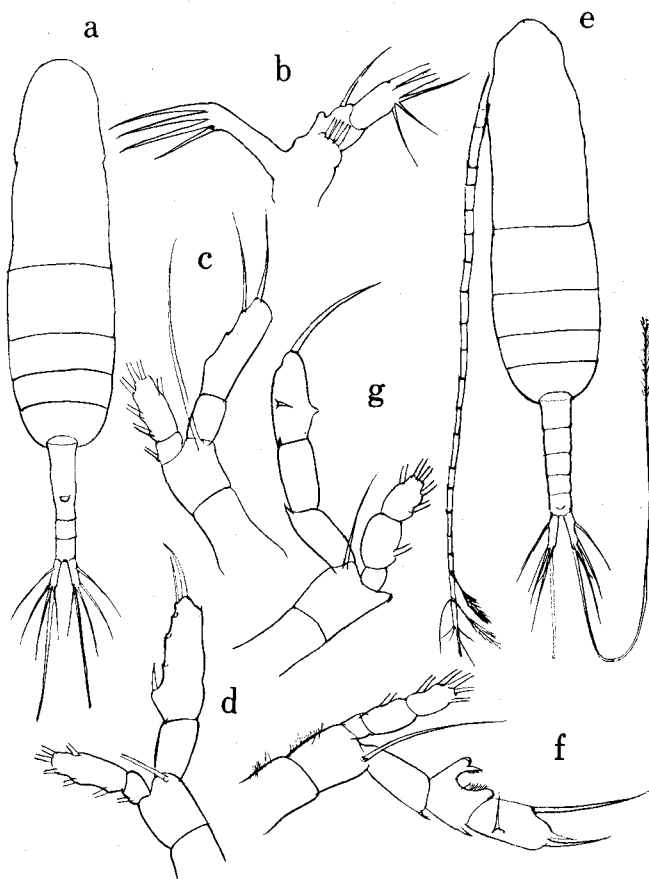
Occurrence. 2 females from Sagami from depths 1000–0 m.

Distribution. The species has been reported by Sars from the temperate Atlantic, and from the Arabian Sea by SEWELL and the Pacific coast of Middle Japan (present record).

Euaugaptilus hecticus (GIESBRECHT).

(Fig. 209, a-g)

Augaptilus hecticus, GIESBRECHT, 1892, p. 400, t. 1, fig. 3; t. 27, fig. 30; t. 28, figs. 59, 16, 33, 27; t. 39, fig. 45; A. SCOTT, 1909, p. 136; WOLFENDEN, 1911, p. 339; *Euaugaptilus hecticus*, FARRAN, 1926, p. 288; 1929, p. 269; SEWELL, 1932, p. 323; WILSON, 1950, p. 205, pl. 21, figs. 297, 299.

Fig. 209. *Euaugaptilus hecticus* (GIESBRECHT).

Female: a, dorsal aspect; b, 1st maxilla; c, 5th leg; d, 5th leg of immature female. Male: e, dorsal aspect; f, right 5th leg; g, left 5th leg.

Female. Length, 2.63 mm: cephalothorax, 1.92 mm; abdomen, 0.71 mm. The cephalothorax elongate ovate. The abdomen 3-jointed; the segments and furca are in the proportional lengths as 54:13:11:22=100. The genital segment slender, contracts at the distal lateral margin. The furcal rami 3.5 times as

long as wide; the 1st inner furcal seta about as long as the total length of the body.

The 1st antenna exceeds the end of the furca by last 5 or 6 segments; the segments are in the following proportional lengths:

Segments.	1	2	3	4	5	6	7	8	9	10	11	12	13	14
	39	26	29	29	32	32	32	32	37	39	41	50	53	50
	15	16	17	18	19	20	21	22	23	24	25			
	47	47	50	53	45	37	39	32	39	45	45	= 1000		

The 2nd antenna has the exopod shorter than the endopod (5:6); the exopod consists of 8 free joints. The mandible one-branched; the cutting edge has 2 teeth. The 1st maxilla has 3 long setae on the outer lobe, 5 setae on the exopod, 1 seta on the 2nd basal, the 3rd inner lobe is represented by a small process; in GIESBRECHT's figure the 3rd inner lobe is represented by a short seta instead of a process; the endopod and 2nd inner lobe absent. The 2nd maxilla and maxilliped as described and figured by GIESBRECHT.

The 5th pair of legs has 2-jointed exopod and endopod. The immature female specimen has the 5th pair of legs furnished with an inner marginal spine on the inner proximal part of the 2nd segment of the exopod.

Male. Length, 2.28 mm: cephalothorax, 1.66; abdomen, 0.62 mm. General appearance as in the female. The abdominal segments and furca are in the proportional lengths as 20:17:14:11:16:22=100. The genital segment as wide as long. The furcal rami 3 times as long as wide.

The left 1st antenna exceeds the end of the furca by distal 3 segments. The grasping antenna on the right.

In the 5th pair of legs the 2nd segment of the exopod of the right leg has a characteristic process on the inner margin.

Remarks. The species can be easily recognised by the slender body, the characteristic shape of the genital segment and the long inner furcal seta.

Occurrence. 2 females and a male from Sagami Bay from depths 1000-0 m.

Distribution. The species has been reported from the Pacific, North Atlantic, Indian seas, Malay Archipelago, Arabian Sea and the Pacific coast of Middle Japan.

Euaugaptilus rigidus SARS.

(Fig. 210, a-i)

Euaugaptilus rigidus, SARS, 1925, p. 298, pl. ciii, figs. 1-14; WILSON, 1950, p. 207, pl. 6, fig. 65, pl. 7, fig. 62.

Female. Length, 5.45 mm: cephalothorax, 4.33 mm; abdomen, 1.12 mm. The cephalothorax moderately robust in dorsal view. The head contracts anteriorly.

There is a sudden discontinuity of the dorsal line on the middle of the cephalic segment when viewed from the lateral. The last thoracic segment produced angularly in dorsal aspect and narrowly rounded at the distal end. The basal part of the rostrum swollen and bears 2 slender filaments.

The abdomen 3-jointed; the segments and furca are in the proportional

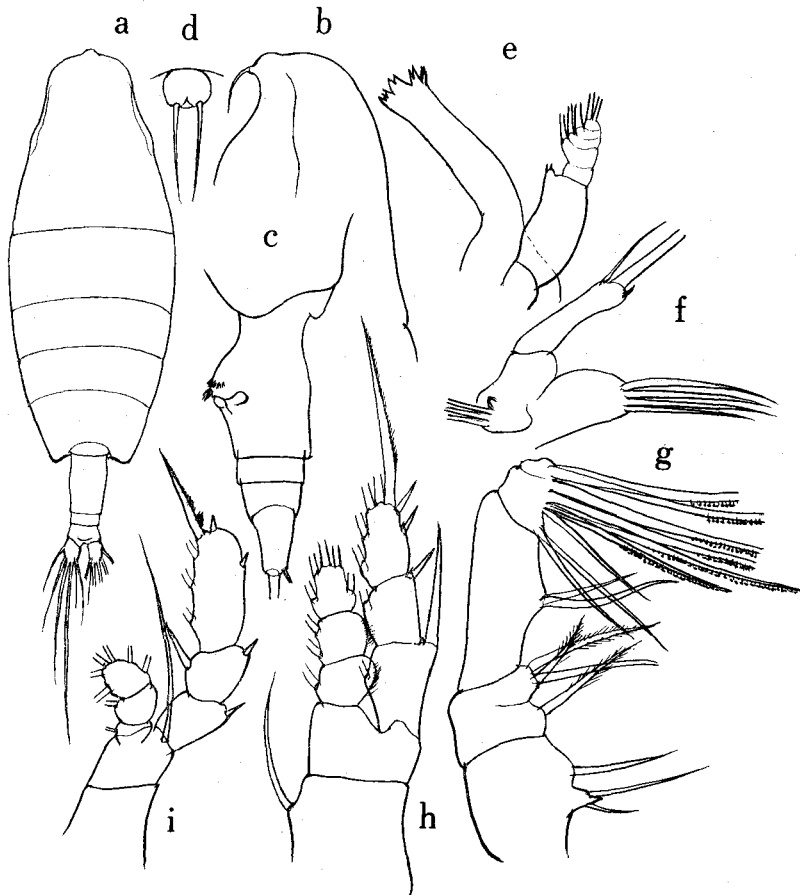


Fig. 210. *Euaugaptilus rigidus* Sars.

Female: a, dorsal aspect; b, head, lateral aspect; c, last thoracic segment and abdomen, lateral aspect; d, rostrum; e, mandible; f, 1st maxilla, g, 2nd maxilla; h, 1st leg; i, 5th leg.

lengths as 58:9:10:23=100. The genital segment swollen below with rows of fine hairs around the genital opening. The furcal rami slightly asymmetrical; the left ramus larger than the right which is about 2 times as long as wide; the appendicular seta short.

The 1st antenna exceeds the end of the furca by distal 2 segments; the

segments are dark-brownly coloured at the distal half. The 2nd antenna strong; the endopod is about as long as the exopod which is composed of 8 free segments. The mandible has a rudimentary endopod represented by a process with 2 spines; the biting part has 6 teeth; the exopod is composed of 5 free joints. The 1st maxilla has 3 setae on the outer lobe; the exopod has a long seta, a short one and a minute spine; the 1st inner lobe has only 4 setae; the endopod, 2nd and 3rd inner lobes absent. The 2nd maxilla has the following numbers of setae on the lobes 1 to 6 and the endopod: the 1st lobe has 2 setae and a spine; the 2nd lobe has a single seta; the 3rd lobe has a seta; the 4th lobe has 3 setae; the 5th lobe has 2 setae; the 6th lobe has 2 setae; the endopod has 7 setae. The setae on the endopod and the lobes 5 and 6 are furnished with "buttons".

In the 1st leg the outer edge spine of the 1st segment of the exopod reaches the base of the 2nd outer edge spine of the 3rd segment of the exopod; the outer edge spine of the 2nd segment and 2 outer marginal spines of the 3rd segment of the exopod are of about equal lengths. The 2nd to 4th legs do not show any interesting features.

In the 5th pair of legs the inner marginal spine of the 2nd segment of the exopod is as long as the 2nd segment of the exopod; the terminal spine of the exopod is shorter than the 3rd segment of the exopod (24:29).

Remarks. The specimen agrees well with the description and figures given by Sars except that the present specimen is larger in size; Sars' specimen measured 4.30 mm, and has the mandible with a rudimentary endopod; the numbers of setae on the 2nd maxilla differ also from those figured by Sars.

Occurrence. 1 female from Sagami from depths 1000-0 m.

Distribution. The species had been recorded by Sars only from Azores until the present specimen was taken from the Pacific coast of Middle Japan.

Genus *Neoaugaptilus* BRODSKY.

BRODSKY (1950) created a genus *Neoaugaptilus* to accommodate *Neoaugaptilus distinctus* BRODSKY taken from the far-eastern and polar seas of the USSR. The genus is closely allied to *Euaugaptilus* Sars, differing from the latter in having 2-jointed exopod and endopod in the 1st pair of legs. Up to the present time no specimens of the genus have been taken from the Izu region.

Genus *Augaptilus* GIESBRECHT.

A. SCOTT recorded the occurrence of *Augaptilus longicaudatus* (CLAUS) from the Malay Archipelago. SEWELL (1932) recorded *A. megalurus* GIESBRECHT from the Indian seas and *A. longicaudatus* (CLAUS) from the Arabian Sea. From the Izu region I have recorded *A. anceps* FARRAN, *A. glacialis* Sars and *A.*

longicaudatus (CLAUS). The genus is characterised by the reduced structure in the 1st maxilla and mandible, and reduced numbers of the segment of the exopod in 2nd antenna.

Augaptilus anceps FARRAN.

(Fig. 211, a-k)

Augaptilus anceps, FARRAN, 1908, p. 79; SARS, 1925, p. 260, pl. lxxxvii, figs. 19-22; WILSON 1950, p. 170.

Female. Length, 5.00 mm: cephalothorax, 3.69 mm; abdomen, 1.31 mm. The cephalothorax elongate ovate. The frontal margin of the head slightly produced and forms a low crest. The lateral distal corner of the last thoracic segment narrowly rounded. The rostral filaments slender and long.

The abdomen 3-jointed; the segments and furca are in the proportional lengths as 47:12:11:30=100. The genital segment slightly produced below; the genital area concave. The furcal rami 4 times as long as wide.

The 1st antenna broken off in the present specimen. The 2nd antenna has a 5-jointed exopod which is slightly longer than the endopod (39:36). The mandible one-branched; the exopod absent; the biting part has 5 teeth. In the 1st maxilla the exopod has 2 setae of about equal lengths; the outer lobe has 2 strong setae; the inner lobe is represented by a single seta. The 2nd maxilla slender; the 1st lobe has a single seta and a small spine; the 2nd lobe has one seta; the 3rd lobe has 2 setae; the 4th lobe has 2 setae; the 5th lobe has a single seta; the 6th lobe has 2 setae; the endopod has 5 setae; some of the setae of the distal segments are furnished with "buttons". The maxilliped has the segments in the proportional lengths as 37:35:27 (endopod); the setae on the distal segments are furnished with "buttons".

The 1st to 5th legs have each 3-jointed exopod and endopod. The 5th pair of legs has an inner edge spine on the 2nd segment of the exopod reaching the base of the 3rd inner marginal seta of the 3rd segment of the exopod; the spine is straight and coarsely denticulated.

Male. Length, 4.23 mm: cephalothorax, 3.00 mm; abdomen, 1.23 mm. The cephalothorax more elongated than in the female. The frontal margin of the head more produced when viewed from the dorsal; in lateral view the head has a low median crest which is strongly chitinized.

The abdomen 5-jointed; the segments and furca are in the proportional lengths as 20:17:15:13:12:23=100. The furcal rami 4 times as long as wide.

The right 1st antenna exceeds the end of the furca by terminal 1 or 2 segments. The grasping antenna on the left side. The 2nd antenna has the exopod and endopod of about equal lengths. The mandible and 2nd maxilla as in the female. The 1st maxilla has 2 terminal setae of equal lengths and a

short one on the outer distal corner of the exopod. The maxilliped bears 2 setae on the 1st lobe of the 1st basal segment.

The 1st leg has a long outer edge spine on the 1st segment of the exopod reaching the distal margin of the 3rd segment of the exopod. The 5th pair of

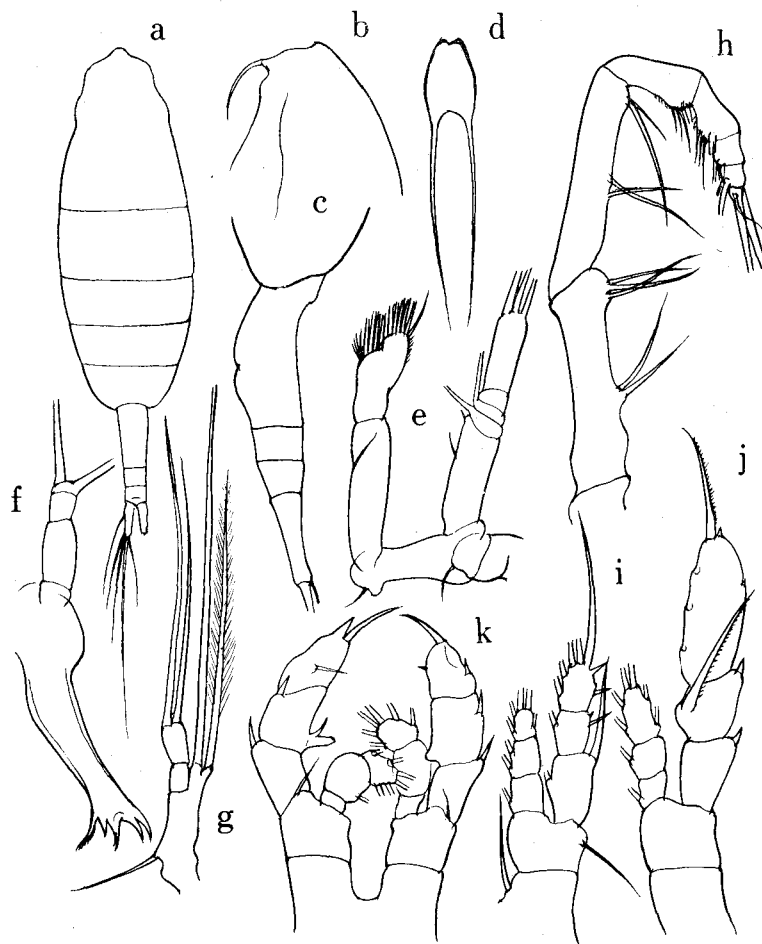


Fig. 211. *Augaptilus anceps* FARRAN.

Female: a, dorsal aspect; b, head, lateral aspect; c, last thoracic segment and abdomen, lateral aspect; d, rostrum; e, 2nd antenna; f, mandible; g, 1st maxilla; h, maxilliped; i, 1st leg; j, 5th leg. Male: k, 5th pair of legs.

legs closely resembles that of *A. megalurus* figured by GIESBRECHT but the process on the inner margin of the 2nd segment of the exopod of the right leg differs in shape from that figured by GIESBRECHT: the proximal process is more prominent and the distal process is smaller in size; the inner distal spine of the 3rd segment of the exopod is larger in size in proportion to that of

megalurus; the outer marginal seta of the 2nd basal segment is much shorter.

Remarks. The present female specimen is closely allied to *A. megalurus* GIESBRECHT but differs from it in the followings: the exopod of the 2nd antenna is slightly shorter than the endopod; the 5th leg has a long inner edge spine on the 2nd segment of the exopod reaching the base of the 3rd inner marginal seta of the 3rd segment of the exopod; the 1st maxilla has only 2 setae on the exopod, whereas, it is 3 in *megalurus*. The present specimen resembles closely *A. anceps* FARRAN in the proportional lengths of the abdominal segments and furca, and in having a long and denticulated inner edge spine on the 2nd segment of the exopod of the female 5th leg. However, it differs from *anceps* in its large size and in the numbers of the marginal setae of the exopod of the 2nd antenna. The specimen comes near to *A. zetesios* WOLFENDEN. The present male specimen may be easily separated from that of *megalurus* in the structure of the 5th pair of legs and in its small size. The specimen of *anceps* described by FARRAN measured 3.75 mm and that of SARS measured 3.60 mm.

Occurrence. 2 females and 1 male from Sagami from depths 1000–0 m.

Distribution. The species has been recorded from the North Atlantic and from the Pacific coast of Middle Japan (the present record).

Augaptilus glacialis SARS.

(Fig. 212, a-i)

Augaptilus glacialis, 1925, p. 254, pl. lxxvi, figs. 1–16; WILSON, 1950, p. 170.

Female. Length, 5.88 mm: cephalothorax, 4.20 mm; abdomen, 1.68 mm. The cephalothorax oblong ovate. The cephalic segment is shorter than the combined lengths of the thoracic segments. The anterior margin of the head obtusely rounded in lateral aspect. The last thoracic segment narrowly rounded on the distal corner. The rostral filaments short.

The abdomen 3-jointed; the segments and furca are in the proportional lengths as 32:10:20:38=100. The genital segment produced below near the proximal; the genital area slightly produced. The ventral surface of the anal segment and furca are coarsely covered with short hairs. The furcal rami 5 times as long as wide. The appendicular seta as long as the innermost one.

The 1st antenna 25-jointed, exceeds the end of the furca by distal 5 segments; the segments are in the following proportional lengths:

Segments.	1	2	3	4	5	6	7	8	9	10	11	12	13	14
	43	15	15	15	16	16	18	20	28	28	35	49	54	57
	15	16	17	18	19	20	21	22	23	24	25			
	60	62	65	66	65	57	52	49	52	38	25	= 1000		

The 2nd antenna has a slender exopod and endopod of about equal lengths; the exopod 4-jointed. The mandible as in the foregoing species; the biting part has 4 teeth. In the 1st maxilla the outer lobe has a long seta beside a short one; the exopod bears 3 terminal setae. The 2nd maxilla and maxilliped as figured by SARS.

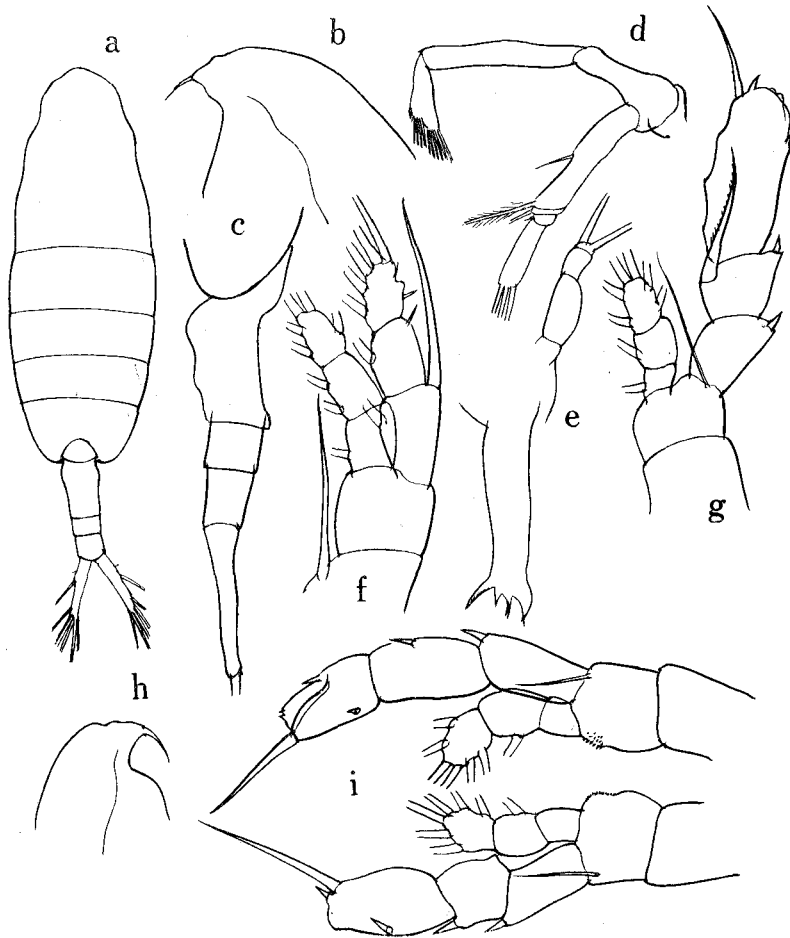


Fig. 212. *Augaptilus glacialis* SARS.

Female: a, dorsal aspect; b, head, lateral aspect; c, last thoracic segment and abdomen, lateral aspect; d, 2nd antenna; e, mandible; f, 1st leg; g, 5th leg. Male: h, head, lateral aspect; i, 5th leg.

The 1st leg has a very long outer edge spine on the 1st segment of the exopod exceeding the distal margin of the 3rd segment of the exopod. The 2nd to 4th legs have no interesting features. The 5th pair of legs has an inner edge spine on the 2nd segment of the exopod reaching the base of the 3rd inner marginal seta of the 3rd segment of the exopod.

Male. Length, 5.19 mm: cephalothorax, 3.75 mm; abdomen, 1.62 mm. General appearance as in the female. The abdominal segments and furca are in the proportional lengths as 16:14:12:11:10:37=100. The furcal rami 5 times as long as wide.

The right 1st antenna exceeds the end of the furca by terminal 1 or 2 segments. The grasping antenna on the left side; the segments 19-21 and 22-23 are fused respectively. The mouth parts and 1st to 4th swimming legs as in the female.

The 5th pair of legs has 3-jointed exopod and endopod. In the left leg the 3rd segment of the exopod is spoon-shaped on the outer margin. In the right leg the 2nd segment of the exopod has a low process on the inner proximal margin. The 2nd basal segment of both legs are each furnished with small denticles on the inner distal corner.

Occurrence. 3 females and a male from Sagami from depths 1000-0 m.

Distribution. The species has been recorded from the North Atlantic and Arctic, also from the Pacific coast of Middle Japan (the present record).

Augaptilus longicaudatus (CLAUS).

(Fig. 213, a-g)

Augaptilus longicaudatus, GIESBRECHT, 1892, p. 400, t. 27, fig. 31; t. 28, figs. 11, 19, 23, 35, 38; t. 29, fig. 22; t. 39, figs. 37, 48; ESTERLY, 1905, p. 188; FARRAN, 1908, p. 78; A. SCOTT, 1909, p. 136; SARS, 1925, p. 256, pl. lxxvi, figs. 17-18; FARRAN, 1929, p. 269; 1936, pl. 113; SEWELL, 1947, p. 232; WILSON, 1950, p. 170.

Female. Length, 3.82 mm: cephalothorax, 2.75 mm; abdomen, 1.07 mm. The cephalothorax slender. The abdominal segments and furca are in the proportional lengths as 38:10:18:34=100. The genital opening is situated proximally; the segment has a slight swelling on the ventral margin between the genital opening and the distal margin of the segment. The furcal rami 5 times as long as wide, and they are divergent. The anal segment and furca are coarsely covered with short fine hairs on the ventral surface.

The 1st antenna exceeds the end of the furca by distal 4 segments; the segments are in the following proportional lengths:

Segments.	1	2	3	4	5	6	7	8	9	10	11	11	13	14
	32	16	16	16	16	18	20	20	28	32	36	50	54	56
	15	16	17	18	19	20	21	22	23	24	25			
	56	58	60	62	62	56	56	52	54	42	30	= 1000		

The mouth parts and swimming legs as described and figured by GIESBRECHT. In the 5th pair of legs the inner marginal spine of the 2nd segment of the

exopod reaches the base of the 2nd inner marginal seta of the 3rd segment of the exopod.

Remarks. The specimen, though much alike to *A. glacialis* Sars, differs from it in its small size, slender cephalothorax and in the proportional lengths of the abdominal segments and furca. CLAUS' specimen measured 3.5–4.0 mm; GIESBRECHT's specimen 3.7–3.85 mm; FARRAN's specimen from the South Atlantic measured 2.04–2.16 mm.

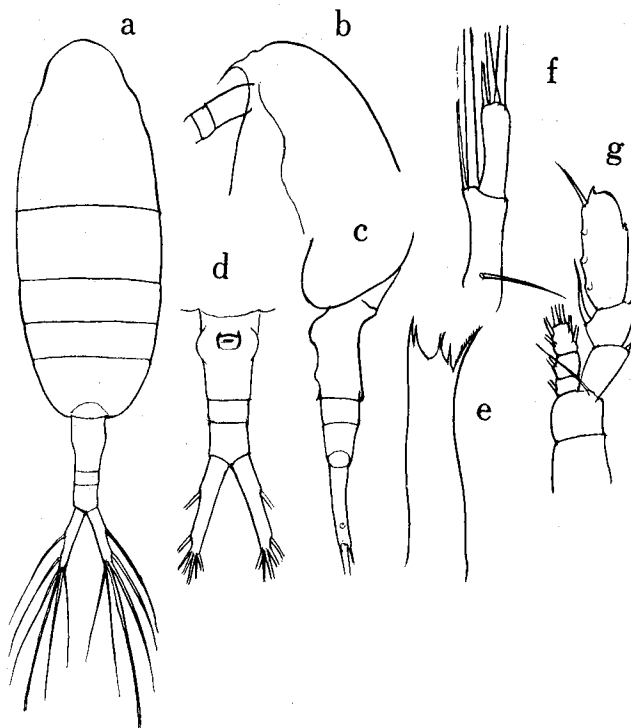


Fig. 213. *Augaptilus longicaudatus* (CLAUS).

Female: a, dorsal aspect; b, head, lateral aspect; c, last thoracic segment and abdomen, lateral aspect; d, abdomen, ventral aspect; e, biting blade of mandible; f, 1st maxilla; g, 5th leg.

Occurrence. 2 females from Sagami from depths 1000–0 m.

Distribution. The species has a wide distribution in the warm waters of the Atlantic, Pacific and Malay Archipelago.

Genus *Centraugaptilus* Sars.

SARS created the genus *Centraugaptilus* to accommodate *Augaptilus rattrayi* T. SCOTT. The genus is closely allied to *Euaugaptilus* but is characterized by the

strong bifurcate rostral filament spines. SEWELL recorded the occurrence of *Centraugaptilus ratttrayi* and *C. horridus* FARRAN from the Indian seas. These species extended now its geographical distribution to the Pacific coast of the Middle Japan.

Genus *Centraugaptilus* Sars.

SEWELL recorded the occurrence of *Centraugaptilus ratttrayi* (T. SCOTT) and *C. horridus* (FARRAN) from the Indian seas and the occurrence of the latter species from the Arabian Sea. BRODSKY has recorded *C. porcellus* JOHNSON, *C. macrodus* ESTERLY, *C. pyramidalis* ESTERLY and *C. lucidus* ESTERLY from the far-eastern seas of the USSR. Among these species *C. pyramidalis* is the synonym of *C. horridus* (FARRAN) and *C. macrodus* is the synonym of *C. ratttrayi* (T. SCOTT) respectively.

Centraugaptilus ratttrayi (T. SCOTT).

(Fig. 214, a-i)

Augaptilus ratttrayi (T. SCOTT), 1893, 36; FARRAN, 1908, p. 78; WOLFENDEN, 1911, p. 341; *Augaptilus macrodus*, ESTERLY, 1911, p. 332, pl. 27, fig. 18; pl. 29, fig. 44; pl. 30, figs. 72, 74; pl. 31, fig. 7; pl. 32, fig. 112; *Centraugaptilus ratttrayi* Sars 1925 p. 304, pl. cvi, figs. 1-14; SEWELL, p. 326; *Centraugaptilus macrodus*, BRODSKY, 1950, p. 388, text-fig. 275; WILSON, 1950, p. 185.

Female. Length, 5.80 mm. The abdomen is contained about 4 times in the length of the cephalothorax. The cephalothorax robust and hirsute. The lateral corner of the last thoracic segment evenly rounded. The rostrum consists of 2 strong spines; in Sars' figure the rostral spine is furnished with each a fine filament on the distal end of the spine but it is absent in the present specimen.

The abdominal segments and furca are in the proportional lengths as 52:11:25:12=100. The genital segment produced below on the proximal half. The genital and 2nd segments are hirsute. The furcal rami slightly wider than long.

The 1st antenna reaches back to the end of the 2nd thoracic segment. The 2nd antenna has the exopod slightly longer than the endopod (36:32); the exopod 7-jointed and the 2nd segment of the exopod is voluminous. The mandible has the exopod and endopod of about equal lengths; the biting part has 3 slender teeth of which the middle one is very small. In the 1st maxilla the outer lobe has 5 long and 2 short setae; the exopod has 3 setae; the 2nd basal has 3 setae; the 1st inner lobe has 3 setae of which 2 carry "buttons" on the distal end; the 2nd and 3rd inner lobes and endopod absent. In the 2nd maxilla the 1st lobe carries a very minute spine and a setae; the 2nd lobe has a strong spine; the 3rd has 2 setae; the 4th has 3 setae; the 5th has 2 setae; the 6th has 3 setae of which one is small. The maxilliped has 2 setae on the middle lobe of

the 1st basal segment; the distal 2 segments of the endopod not so elongated as figured by Sars. The setae on the 2nd maxilla and maxilliped are furnished with "buttons".

The 1st leg has no outer edge spines on the 2nd and 3rd segments of the exopod; the distal segment of the exopod has 4 marginal setae; the 3rd segment of the endopod has 6 setae in all. In the 2nd to 4th legs the exopod and endopod are 3-jointed; the segments of the exopod broad; the 3rd segment of the exopod has 3 marginal spines and 5 inner marginal setae.

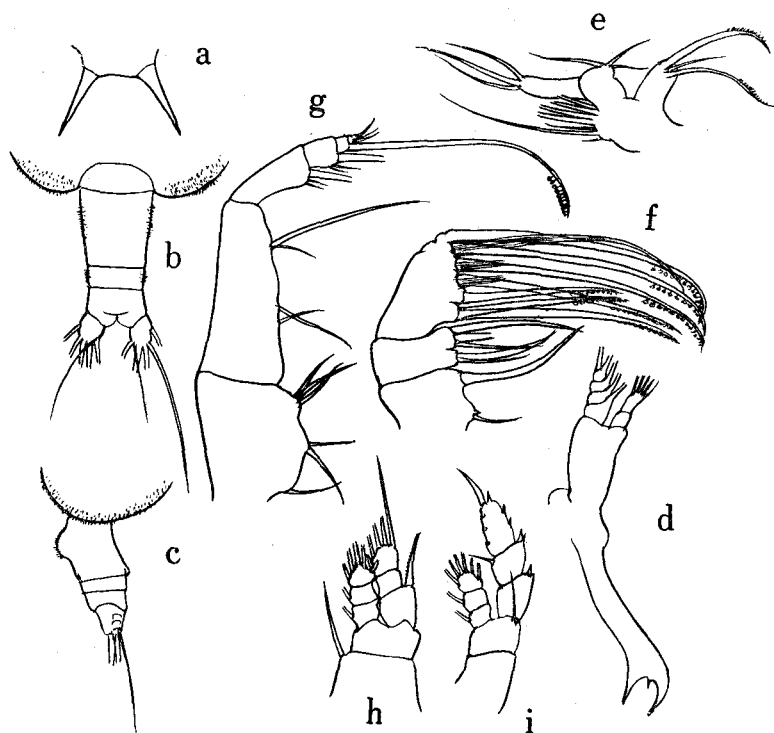


Fig. 214. *Centraugaptilus rattrayi* (T. SCOTT).

Female: a, rostrum; b, abdomen, dorsal aspect; c, last thoracic segment and abdomen, lateral aspect; d, mandible; e, 1st maxilla; f, 2nd maxilla; g, maxilliped; h, 1st leg; i, 5th leg.

The 5th pair of legs small; the 2nd segment of the exopod has a short inner marginal spine; the end-spine of the exopod about as long as the 3rd segment of the exopod.

Remarks. SCOTT's original specimen measured 4.9 mm in the female; Sars' 6.0 mm; SEWELL's specimen from the Indian seas measured 4.8 mm. The specimen from the far-eastern seas of the USSR measured 5.34 mm in the female.

Occurrence. One female from Sagami from depths 1000-0 m.

Distribution. The species appears to have a fairly wide distribution and has been recorded from the North Atlantic, Gulf of Guinea, Indian seas, San Diego region, far-eastern seas of the USSR and the Pacific coast of Middle Japan.

Centraugaptilus horridus (FARRAN).

(Fig. 215, a-g)

Augaptilus horridus, FARRAN, 1908, p. 78, pl. viii, fig. 20; *Augaptilus pyramidalis*, ESTERLY, 1911, p. 334, pl. xxvi, figs. 19; pl. xxx, fig. 69; xxxii, fig. 106; *A. horridus* SEWELL, 1913, p. 354; *Centraugaptilus horridus*, 1925, p. 307, pl. cvii, figs. 11-11; SEWELL, 1932, p. 326, text-fig. 107, a-g; 1947, p. 232; *Centraugaptilus pyramidalis*, BRODSKY, 1950, p. 389, text-fig. 276; WILSON, 1950, p. 185.

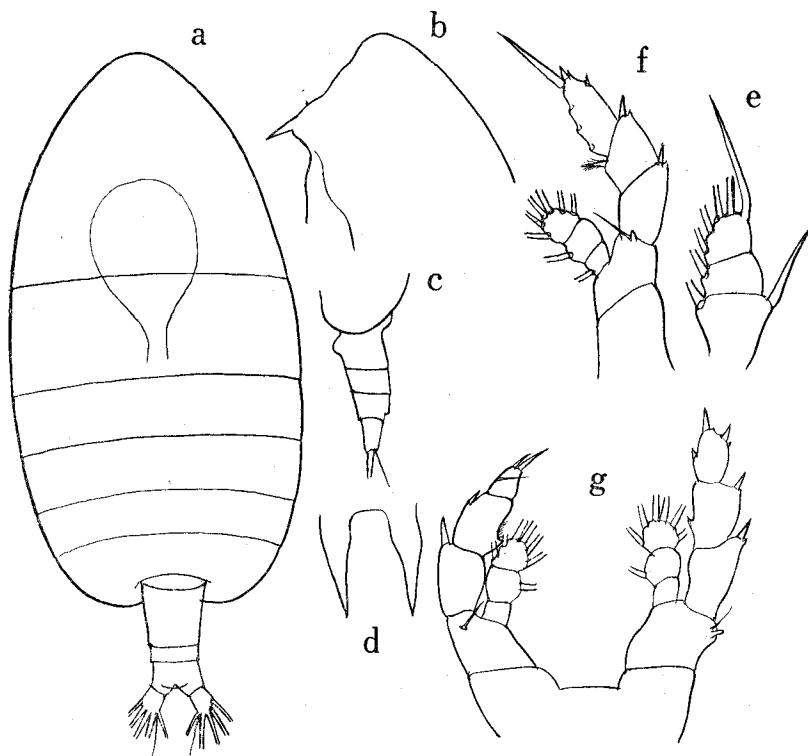


Fig. 215. *Centraugaptilus horridus* (FARRAN).

Female: a, dorsal aspect; b, head, lateral aspect; c, last thoracic segment and abdomen, lateral aspect; d, rostrum; e, exopod of 1st leg; g, 5th leg. Male: h, 5th pair of legs.

Female. Length, 9.45 mm: cephalothorax, 7.76 mm; abdomen, 1.69 mm. The cephalothorax very robust and hirsute. The cephalic segment much vaulted anteriorly.

The abdomen 3-jointed; the segments and furca are in the proportional lengths as $42:13:29:16=100$. The genital segment about as long as wide. The furcal rami as long as wide.

The 1st antenna reaches back to the posterior margin of the 3rd thoracic segment. The 2nd antenna has the exopod and endopod of about equal lengths. The mandible has the exopod about 1.7 times as long as the endopod. The other mouth parts and the swimming legs resemble those of *C. rattrayi* (T. SCOTT).

Male. Length, 8.33 mm : cephalothorax, 7.39 mm ; abdomen, 1.94 mm. General appearance as in the female. The abdominal segments and furca are in the proportional lengths as $32:13:13:10:26:16=100$.

The grasping antenna on the left side; the segments 18-21 and the segments 22-23 are fused.

In the 5th pair of legs the 2nd basal segment of the right leg is furnished with short hairs on the proximal inner margin.

Remarks. The species is easily recognised by its large size. According to SEWELL the species exhibits a considerable variation in size: FARRAN's female specimen measured 10 mm ; Jespersen's 7.5 mm ; ESTERLY's specimen from the Northeast Pacific measured 6.68 mm ; SEWELL's specimen from the Arabian sea measured 6 to 7 mm in the female.

Genus *Augaptilina* SARS.

The genus was created by SARS in 1920 to accomodate a single species, *Augaptilina scopifers* SARS which differs from other genus of the family *Augaptilidae* in the structure of the 2nd maxilla and maxilliped. Up to the present time no examples of the genus have been taken from the Izu region. The species has neither been recorded from the Malay Archipelago nor from the Indian seas.

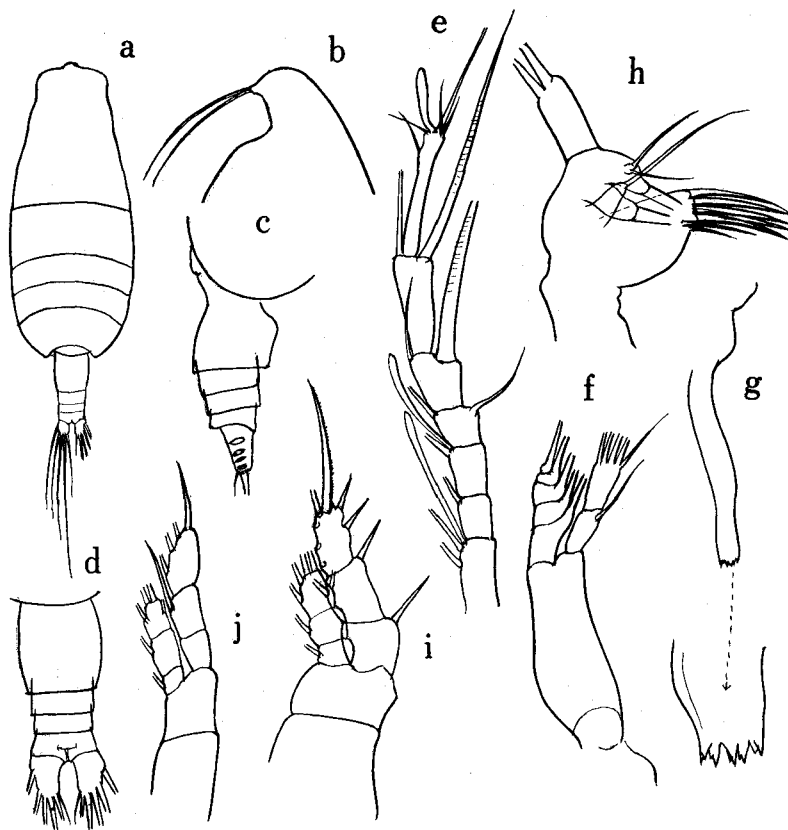
Genus *Pseudaugaptilus* SARS.

The genus was created by SARS in 1907 to accomodate a single species, *Pseudaugaptilus longiremis* SARS taken from the North Atlantic. The genus comes near to *Haloptilus* in having 4-jointed abdomen but is distinguished from it in the shape of the body and in the structure of the 1st maxilla. BRODSKY recorded the occurrence of the another species, *P. polaris* from the far-eastern seas of the USSR. VERVOORT recorded *P. longiremis* from the Antarctic. Up to the present time no specimens have been obtained from the Malay Archipelago or from the Indian seas. From the Izu region a single species, *P. orientalis* was described which appears to be new to science.

Pseudaugaptilus orientalis sp. nov.

(Fig. 216, a-g)

Female. Length, 3.89 mm: cephalothorax, 3.07 mm; abdomen, 0.82 mm. The head separates from the 1st thoracic segment. The frontal margin of the head slightly truncate, with median papilla; in lateral aspect the head is narrowly

Fig. 216. *Pseudaugaptilus orientalis* sp. nov.

Female: a, dorsal aspect; b, head lateral aspect; c, last thoracic segment and abdomen, lateral aspect; d, abdomen, dorsal aspect; e, distal segments of 1st antenna; f, mandible palp; g, biting blade of mandible; h, 1st maxilla; i, 1st leg; j, 5th leg.

rounded and carries 2 long rostral filaments. The last 2 thoracic segments are fused; the lateral corner of the last thoracic segment rounded.

The abdomen 4-jointed, contained 3.5 times in the length of the cephalothorax. The segments and furca are in the proportional length as 50:11:11:11:17=100. The furcal rami about as long as wide; the appendicular seta feeble.

The 1st antenna extends beyond the end of the furca by distal 2 segments; the segments 23 and 24 carries each a very heavy seta on the posterior distal margin; the distal segment is 1.3 times as long as the penultimate one. In the 2nd antenna the exopod and endopod slender; the exopod 8-jointed, 1.1 times as long as the endopod. The mandible has the exopod and endopod of about equal lengths; the masticatory lobe slender and small. The 1st maxilla has 7 spines on the 1st inner lobe; the 2nd and 3rd lobes have each a long seta; the 2nd basal segment is represented by a long strong seta; the endopod has 2 small setae; the exopod cylindrical in shape, has 2 strong setae of about equal lengths. The 2nd maxilla and maxilliped resemble those of *longiremis* figured by Sars.

The 1st to 4th swimming legs have each 3-jointed exopod and endopod. The 1st leg has an outer edge spine on the 2nd segment of the exopod; this spine is absent in Sars' figure. The 2nd to 4th legs as those of *longiremis* Sars.

The 5th pair of legs simple in structure as shown in the figure; the inner edge spine of the 2nd segment of the exopod extends to the end of the 3rd segment of the exopod.

Remarks. The specimen comes very near to *Pseudagaptilus longiremis* Sars but can be distinguished from it by the presence of the outer edge spine on the 2nd segment of the exopod in the 1st leg and in having a long inner edge spine on the 2nd segment of the exopod of the 5th pair of legs. Sars' specimen of *longiremis* measured 4.10 mm in the female.

Occurrence. One female from Sagami from depths 1000-0 m.

Distribution. The Pacific coast of Middle Japan.

Genus *Pontoptilus* Sars.

SEWELL (1932) recorded the occurrence of *Pontoptilus ovalis* Sars from the Indian seas. VERVOORT recorded *P. ovalis* from the Antarctic. Up to the present time I have failed to find any species of the genus. The genus is distinguished from other genera of the family Augaptilidae in the shape of the body and in the structure of various appendages.

Genus *Pachytilus* Sars.

Sars (1920) created the genus to accommodate *Pachytilus abbreviatus* Sars that had been previously contained in the genus *Pontoptilus* Sars. The genus at present time comprises 4 species of which 3 have been detected from the Izu region; they are *Pachytilus abbreviatus* Sars, *P. pacificus* JOHNSON and *P. eurygnathus* Sars. BRODSKY recorded the occurrence of *P. pacificus* JOHNSON from

the far-eastern seas of the USSR. The genus is characterized by the robust cephalothorax and in having bifurcate rostrum, strong biting blade of the mandible and single-jointed endopod in the 5th pair of legs.

Pachyptilus abbreviatus Sars.

(Fig. 217, a-j)

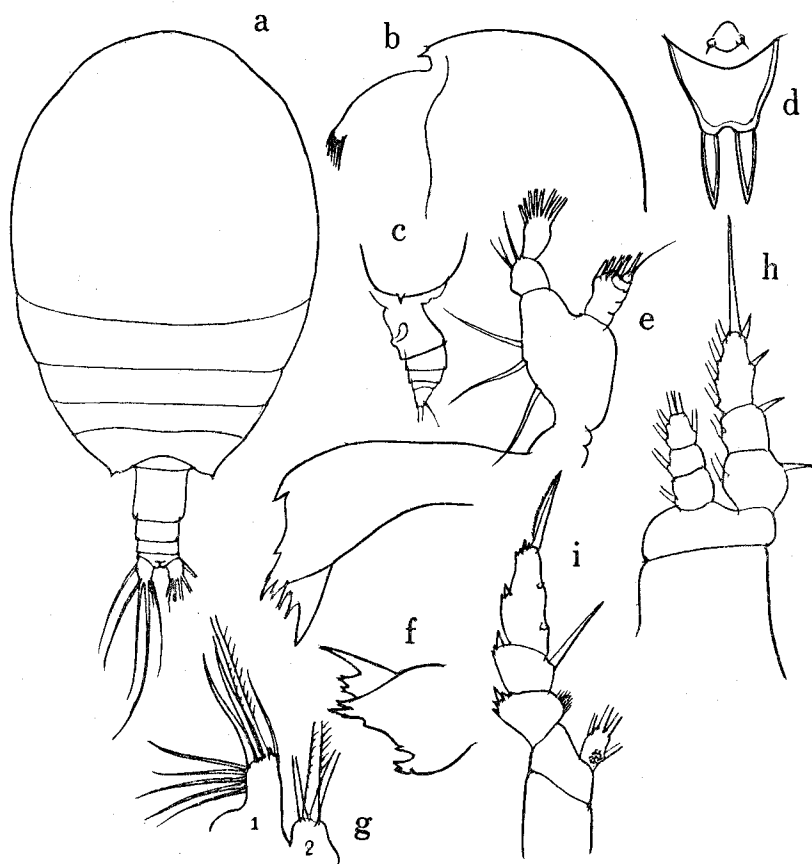


Fig. 217. *Pachyptilus abbreviatus* Sars.

Female: a, dorsal aspect; b, head, lateral aspect; c, last thoracic segment and abdomen, lateral aspect; d, rostrum and frontal organ, anterior aspect; e, mandible left; f, biting blade of right mandible; g, 1st and 2nd lobes of 2nd maxilla; h, 1st leg; i, 5th leg.

Pachyptilus abbreviatus, Sars, 1925, p. 319, pl. cxiii; JESPERSEN, 1934, p. 114; WILSON, 1950, p. 274.

Female. Length, 4.06 mm: cephalothorax, 3.25 mm; abdomen, 0.81 mm. The cephalothorax robust and rounded, about 7/8 as wide as long. The last thoracic

segment rounded with a small triangular process on the posterior lateral margin. The rostrum small, consists of 2 short spines attached to the basal part.

The abdominal segments and furca are in the proportional lengths as 39:28:11:11:11=100. The genital segment wider than long (23:17), produced slightly below on the genital area. The furcal rami 1.6 times as wide as long.

The 1st antenna 25-jointed, extends to the distal margin of the genital segment. The 2nd antenna has the exopod about 1.5 times as long as the endopod; the exopod 8-jointed. The mandible has a characteristic biting part as shown in the figure. The 1st maxilla well developed. The 2nd maxilla and maxilliped robust; in the 2nd maxilla the 1st lobe has, beside 5 setae as has been figured by Sars, more 4 slender setae and a small spine on the proximal margin. The swimming legs just as figured by Sars.

Remarks. The specimen, though slightly larger in size than those reported by Sars, agrees well with description and figures except that the 1st antenna is short, only extending to the distal end of the body and in having more setae on the 1st lobe of the 2nd maxilla.

Occurrence. 2 females from depths 1000-0 m in Sagami Bay.

Distribution. The species has been recorded from the North Atlantic, Azores, Canary and Baffin Bay.

Pachyptilus pacificus JOHNSON.

(Fig. 218, a-h)

Pachyptilus pacificus, JOHNSON, 1936, p. 65, fig. A, 4, 5; B, 1-10; BRODSKY, 1950, p. 391, text-fig. 279.

Female. Length, 5.50 mm: cephalothorax, 4.90 mm; abdomen, 1.34 mm. The cephalothorax robust and ovate; the greatest width measured 3.0 mm. The head separates from the thoracic segment; the last 2 thoracic segments are fused; the lateral corner of the last thoracic segment bluntly produced. The rostral prominence low, with 2 slender filaments. The anterior lip is much swollen below in lateral aspect.

The abdomen 4-jointed, contained 3.6 times in the length of the cephalothorax, the segments and furca are in the proportional lengths as 50:12:8:10:20=100. The genital segment as long as wide, produced below. The furca longer than wide; the appendicular seta very short.

The 1st antenna 25-jointed exceeds the end of the furca by distal 4-segments; the segments are in the following proportional lengths:

Segments.	1	2	3	4	5	6	7	8	9	10	11	12	13	14
	50	14	16	16	19	19	19	22	24	26	31	40	56	59
	15	16	17	18	18	20	21	22	23	24	25			
	61	61	64	61	61	52	52	49	56	52	14	= 1000		

the terminal segment is very short. The 2nd antenna has 8-jointed exopod which is 1.5 times as long as the endopod; the 2nd segment of the endopod has 7+8 setae. The mandible very characteristic; the biting part is very strong as shown in the figure; the 2nd basal segment bears a single seta on the inner margin. The 1st maxilla has the following numbers of setae on the various parts: the 1st inner lobe has 15 spines; the 2nd inner lobe has 4 setae; the 3rd

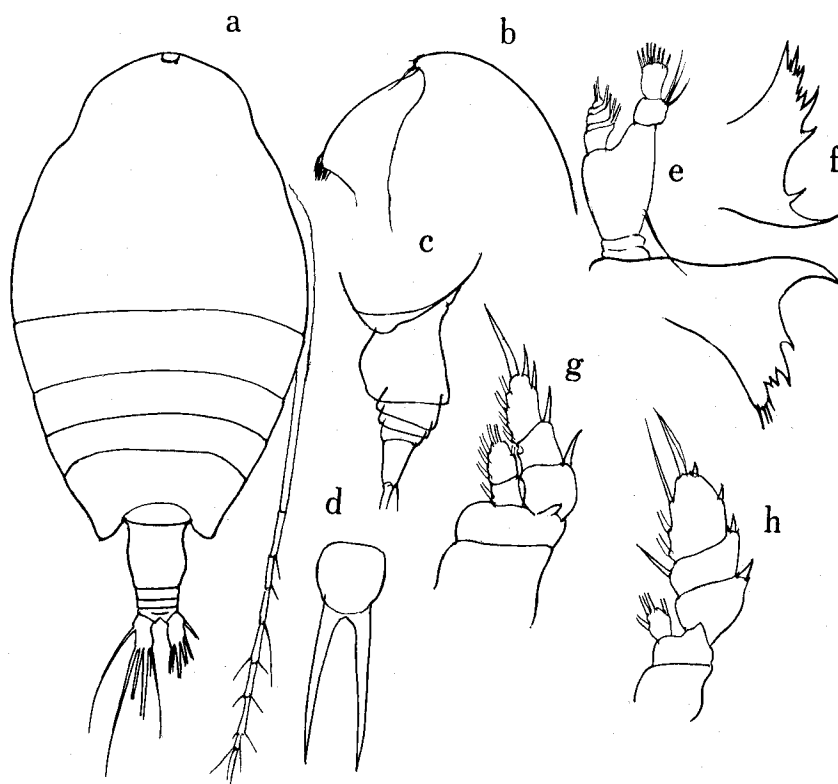


Fig. 218. *Pachyptilus pacificus* JOHNSON.

Female: a, dorsal aspect; b, head, lateral aspect; c, last thoracic segment abdomen, lateral aspect; d, rostrum; e, left mandible; f, biting blade of right mandible; g, 1st leg; h, 5th leg.

inner lobe has 4 setae; the 2nd basal segment has 3 setae; the endopod has 3+8 setae; the exopod has 8 setae; the 2nd outer lobe has a single seta; the 1st outer lobe has 9 setae. The 2nd maxilla robust; the spinulation on the various parts as follows: the 1st lobe 2; the 3rd lobe 3; the 4th lobe, 3; the 5th lobe, 3+ a small spine; the 6th lobe, 3 setae; the spine on the 5th lobe is very long. The maxilliped robust and of an unusual structure.

The 1st leg has 3-jointed exopod and 2-jointed endopod; the 2nd basal

segment has a small protuberance at the junction with the exopod. The 2nd to 4th legs have each 3-jointed exopod and endopod.

The 5th pair of legs has 3-jointed exopod and 1-jointed endopod.

Remarks. The specimen resembles *P. eurygnathus* Sars but can be distinguished from it by its large size and in having a 2-jointed endopod in the 1st leg. These characters agree well with the description of *P. pacificus* given by JOHNSON.

Occurrence. 6 females from depths 1000–0 m in Sagami Bay.

Distribution. The species has been reported from the North Pacific, the south of Aleutian Island and from the far-eastern seas of the USSR and the Pacific coast of Middle Japan.

Pachyptilus eurygnathus Sars.

(Fig. 219, a–f)

Pachyptilus eurygnathus Sars, 1925, p. 321, pl. cxiv; JESPERSEN, 1934, p. 115; WILSON, 1950, p. 274.

Female. Length, 5.00 mm: cephalothorax, 4.50 mm; abdomen, 0.50 mm. The cephalothorax ovate and robust. The posterior lateral margin of the last thoracic segment bluntly triangular in dorsal aspect; the distal corner of the segment narrowly rounded in lateral aspect. The rostrum consists of 2 slender filaments.

The abdomen 4 jointed, much telescoped in the present specimen; the segments and furca are in the proportional lengths as 55:9:6:12:18=100. The genital segment wider than long, produced moderately below. The furcal rami as long as wide.

The 1st antenna exceeds the end of the furca by distal 5 segment; the segments are in the following proportional lengths:

Segments.	1	2	3	4	5	6	7	8	9	10	11	12	13	14
	50	11	14	14	15	17	17	20	22	25	34	43	59	62
	15	16	17	18	19	20	21	22	23	24	25			
	62	67	70	67	65	53	53	41	53	48	17	= 1000		

the 8th segment has a marginal spine; the 15th is slightly shorter than the 16th. The 2nd antenna has the exopod 1.2 times as long as the endopod. The mandible has the biting part less complicated than that of *P. pacificus*; the mandibular palp carries 3 inner marginal setae. The maxillae and maxilliped as those of *pacificus*.

The 1st leg has 3-jointed exopod and endopod. The 5th pair of legs has 3-jointed exopod and 1-jointed endopod.

Remarks. The example agrees well with the description and figures of

eurygnathus given by Sars except some minute joints of difference in the spinulation of the 1st and 2nd maxilla.

Occurrence. 3 females and an immature male from depths 1000-0 m in Sagami.

Distribution. The species has been recorded from the temperate Atlantic in the midway from Gibraltar and Madeira and off coast of Lisbon, Canaries. Also recorded from cold water of the North Atlantic, Baffin Bay and Davis Strait.

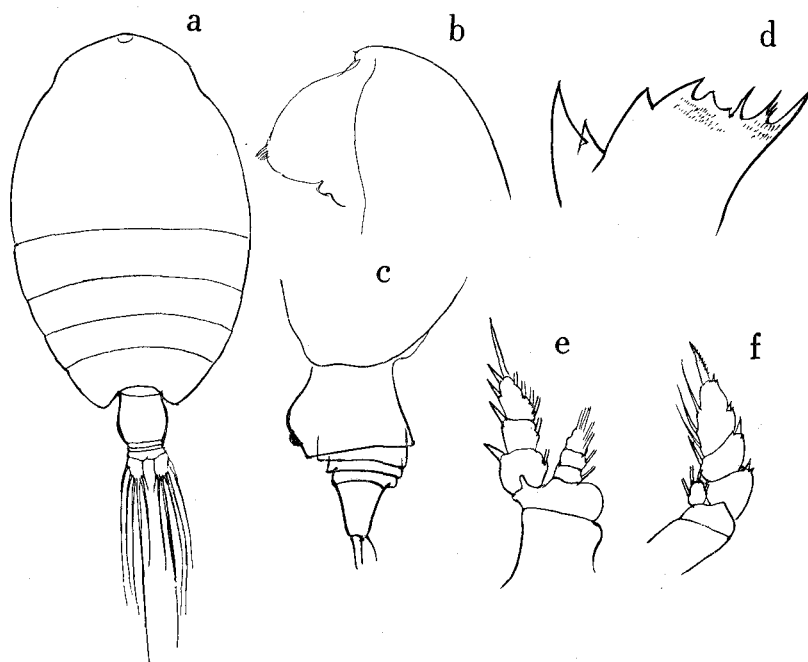


Fig. 219. *Pachyptilus eurygnathus* Sars.

Female: a, dorsal aspect; b, head, lateral aspect; c, last thoracic segment and abdomen, lateral aspect; d, biting blade of right mandible; e, 1st leg; f, 5th leg.

Genus *Heteroptilus* Sars.

The genus was created by Sars in 1920 to accommodate *Heteroptilus attenuatus* Sars and *H. acutilobatus* Sars which had previously been contained in the genus *Pontoptilus* Sars. Up to the present time no examples of the genus have been recorded from the Indian seas or from the Pacific. Sewell (1947) recorded the occurrence of *H. acutilobus* Sars and *H. sp.* from the Arabian Sea. The genus is characterized by the singular structure of the mandible blade.